MUNICIPAL ENGINEERING

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VOLUME XLIII OCTOBER, NINETEEN HUNDRED TWELVE NUMBER FOUR

THE AUTOMOBILE IN MUNICIPAL SERVICE.

The automobile as a municipal service vehicle for practically all departments has already proved its efficiency and economy to such an extent as to command the attention of every wide-awake city official. And yet this commercial application of automobiles is of such comparatively recent origin that city officials generally have not fully awakened to the possibilities. The "Roll Call of Cities Operating Automobiles," in this issue of MUNICIPAL ENGINEERING, gives a very comprehensive idea of the progress of this important development to date. Of the 1,200 machines operating in nearly 150 cities covered in this report, not more than ten per cent were in operation in 1909 and practically no motor driven municipal service vehicles were in use prior to 1905. The movement has meant in many cases revolutionary changes in methods, but the results have been gratifying alike to city officials and to the tax-paying public. Cities which foster an ambition to be leaders in their class will lose no time in profiting by the examples before them and in realizing the full benefits of economizing time and money and increasing efficiency.

EFFECT OF AUTOMOBILE ON STREET IMPROVEMENTS.

The adaptation of the automobile to the requirements of properly conducting various departments of public work can not help but have an important bearing ultimately at least upon certain kinds of physical improvement work. The fullest efficiency of the automobile is dependent upon good, well built streets and roads and upon proper housing and garage facilities. It makes possible the creation of larger districts in the police, fire, park and health departments. The constant use of automobiles by city officials in conducting their work will serve to impress the importance of good boulevards and extensions of present boulevard systems. It makes more easily possible the annexation of suburbs and

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outlying districts and the consequent reduction of what now may seem to be necessarily congested districts.

The municipal automobiles for their highest efficiency, especially in covering outlying territory, emphasize the necessity for better pavements in such districts. It has been thought that a simple grading or a gravel street was sufficient improvement for streets not yet fully built upon. But when a fire engine gets caught in a mud hole the benefits of the new system are lost. It is no better than the old horse system. The road builders have developed cheap methods of improving country roads which are equally good for the streets in the new districts in a developing city, during the process of development.

Small towns are oiling their streets with benefit. Cities can do the same, or can improve on this by using the various methods of making bituminous surfaces with tar or asphalt. There will shortly be as great an increase in the use of these materials on many miles of city streets as there has been in the past few years on main country roads.

RELIEF OF CONGESTED TRAFFIC.

The suggestion made by a prominent traffic official in Chicago to the effect that traffic congestion could be largely avoided by the elimination of horse drawn vehicles from crowded streets is well worth considering. The time is probably not far distant when the larger cities will be compelled of necessity to adopt some such ruling.

HOUSING AN IMPORTANT MUNICIPAL PROBLEM.

The housing problem is as much a problem of the city official and of the legislator as of the housing reformer. The article in this issue of MUNICIPAL ENGINEERING by Albion Fellows Bacon in "The Problem of a Growing City" points out conditions resulting from overcrowding and explains how such conditions are a menace to public health and morals. It mentions also the burden of expense imposed upon cities as a result of such deplorable conditions. This expense burden, when properly impressed upon those in authority or those in position to effect reforms, will probably be more likely to awaken an active interest calculated to accomplish something worth while than all the volumes which might be written on the side of health, morals, decency, comfort or convenience. When the public is thoroughly aroused to the fact that the slums are productive of moral and physical derelicts who become expensive public burdens, then our slums will disappear.

THE ROLL CALL OF CITIES OPERATING AUTOMOBILES.

THE following tables contain a compilation of information relative to automobiles in municipal service. These data were taken from reports sent to MUNICIPAL ENGINEERING by the mayors, or department heads of the various cities included in the list. The great volume of information submitted made necessary the use of abbreviations in a great many instances, and the following explanation is appended to make clear any doubtful meaning:

Am. La Fr. for American La France.
Pope-Hart. for Pope-Hartford.
Pierce for Pierce-Arrow.
Kissell for Kissell Kar.
Stoddard for Stoddard-Dayton.
Har.-Dav. for Harley-Davidson.
Excels'r. for Excelsior.
Stev.-Dur. for Stevens-Duryea.
R. C. H. for R. C. Hupp.
(c) for motorcycle.
(t'k) for truck.
A. Ladder for aerial ladder.

Comb. H C for combination hose and chemical car.

Comb. P H for combination pumping engine and hose car.

Comb. P H C for triple combination pumping engine, hose and chemical car.

Comb. H L for combination hose and ladder car.

Water Tow. for water tower.

Comb. P A for combination patrol and ambulance.

In cases where cars have been described as serving two or more departments of the municipality, they have been classified only under that department in which they give the greater service.

FIRE DEPARTMENT MOTORS.

No. in Service.	Make.	Horse Power Rating.	Mileage per Month.	Cost per Mo. Fuel & Oil.	Service.
ALABAMA.					
Birmingham—					
12	.....	52.9	...	.....	Comb. H C
6	.....	79.3	...	.....	Comb. H C
2	.....	52.3	...	.....	Com. P H C
1	.....	78.0	...	.....	Pumping
	(Motorized Steam Engine.)				
Mobile—					
1	.....	50	...	.....	Comb.
Montgomery—					
2	Am. La Fr.	70	...	.....	Comb. H C
1	White	40	...	.....	Chemical
CALIFORNIA.					
Bakersfield—					
1	....	..	...	.....	Chief
1	Waterous . ..	..	...	.....	Pumping
Berkeley—					
1	Pope-Hart.	60	...	.....	Squad
2	Knox	50	...	.....	Comb. H C
1	Seagrave ..	80	...	.....	Comb. H.C
Pasadena—					
1	Robinson	..	...	.....	Chemical
1	Schenk	..	...		
2	Seagrave	..	...	.....	Comb. H C
Redlands—					
1	Seagrave ..	52	...	.....	Comb. H C
San Diego—					
2	Seagrave ...	80	...	.....	Comb. H C
1	Seagrave ..	90	...	.....	A. Ladder
1	Rambler ...	40	...	.....	Comb. H C
1	Stutz	40	...	.....	Chief
San Francisco—					
1	Pope-Hart. ..	..	...	.....	Chemical
1	Am. La Fr. ..	..	...	.....	Chemical
1	Seagrave ..	80	...	.....	Ladder
2	Pierce	..	...	.....	Chief
1	Pope-Hart. ..	..	...	.....	Chief
San Jose—					
1	Winton	60	50	$3.50	Chemical

No. in Service.	Make.	Horse Power Rating.	Mileage per Month.	Cost per Mo. Fuel & Oil.	Service.
COLORADO.					
Colorado Springs—					
1	Knox	..	...		
	(Tractor attached to engine.)				
1	Knox	60	...	.....	Comb. H C
1	Gramm ...	40	...	3.50	Comb. H C
1	Chalmers ..	30	...	15.00	Chief
CONNECTICUT.					
Hartford—					
3	Amoskeag . ..	..	...	.....	Engines
1	Pope-Hart. ..	..	...	.....	Chemical
1	Am. La Fr. ..	..	...	.....	Tractor
1	Pope-Hart. ..	..	...	.....	Comb. H C
1	Knox	..	...	.....	Comb. H C
3	Pope-Hart. ..	..	...	.....	Comb. H C
	(Ordered for Immediate Delivery.)				
1	Pope-Hart. ..	..	...	.....	Practice
3	Pope-Hart. ..	..	...	.....	Chief
Middletown—					
1	Pope-Hart. ..	..	...	3.50	
New Haven—					
1	Pope-Hart.	50	60	2.00	Squad.
1	Webb	90	30	5.00	Comb. H C
1	Pope-Hart.	50	25	2.00	Comb. H C
1	Pope-Hart.	50	800	20.00	Chief
1	Pope-Hart.	40	800	20.00	Marshal
2	Ford	20	300	2.75	Chiefs
1	Continent'l	30	200	3.50	Alarms
Norwich—				.....	Chemical
1	....	..	...		
Stamford—					
1	Am. La Fr.	100	9.53	9.12	Comb. P H
1	Locomobile	45	26	5.73	Comb. H C
FLORIDA.					
Tampa—					
1	....	..	...	.....	Chief
3	....	..	...	.....	Comb. H C
1	(Ordered for Immediate Delivery.)				

No. in Service.	Make.	Horse Power Rating.	Mileage per Month.	Cost per Mo. Fuel & Oil.	Service.
	GEORGIA.				
Atlanta—					
1	.....	..	...	.....	Chief
Augusta—					
1	Webb	90	300	8.62	Comb. P H
2	Webb	60	125	6.38	Comb. H C
1	Oldsmobile	.45	...	7.03	Chief
Rome—					
2	Seagrave ..	53	20	3.82	Comb. H C
1	Buick	22	50	4.60	Chief
	ILLINOIS.				
Bloomington—					
1	Seagrave ..	75	40	5.00	Comb. H C
Chicago—					
1	Webb	70	8	2.49	Comb. H C
3	Mais	24	...		
3	Robinson ..	80	4186	94.80	Comb. H C
17	Harder	45	...	.....	Comb. H C
3	Harder	48	...	.....	Squad
	(Not in service.)				
1	Special	30	...	.....	Official
1	Pierce	48	...	.....	Official
2	Halladay ..	40	5264	45.52	Official
3	Overland ..	30	...	.....	Official
1	Apperson ..	40	...	.....	Official
Decatur—					
1	Special	57	15	3.00	Comb. H C
1	Special	..	...	.....	Comb. H C
	(Made by Townsend Bros. local, Atterberry Chassis.)				
1	Rambler ...	45	185	5.00	Chief
Evanston—					
1	Robinson ..	..	...	.....	Com. P C H
Kankakee—					
1	Kissel	50	10	0.75	Comb. H C
Peoria—					
1	Robinson ..	80	...	.....	Comb. H C
1	Robinson ..	110	...	.....	Comb. P H
Quincy—					
1	Seagrave ..	50	...	28.36	Comb. H C
1	Hupmobile .	20	...	11.90	Chief
Rockford—					
2	.....	..	...	.....	Pumping
3	.....	..	...	.....	Comb. H C
1	.....	..	...	.....	Ladder
Waukegan—					
1	Seagrave ..	53	25	3.25	Comb. H C
	INDIANA.				
Elkhart—					
1	Webb	90	53	3.21	Comb. P H
Indianapolis—					
1	Am. La Fr.	..	...	.....	Comb. P H
2	Am. La Fr.	72	...	.....	Comb H C
1	Packard ...	30	129	4.23	Squad
1	Packard	30	179	.....	Squad
1	Mais	30	...	.....	Ladder
1	Buick	..	...	.....	Supply
1	Premier ...	..	...	.....	Chief
1	Stutz	..	...	.....	Chief
Muncie—					
1	Cadillac ...	..	...	.....	Chief
South Bend—					
1	Rambler ...	50	200	.....	Chemical
1	Studebaker .	30	300	.....	Chief
Terre Haute—					
1	Oldsmobile .	30	35	1.75	Comb. H C
1	Cadillac ...	36	95	3.50	Alarm
	IOWA.				
Davenport—					
1	Buick	..	...		Chief
1	Seagrave ..	..	...	.....	Tractor
1	Seagrave ..	..	...	.....	Comb. H L
1	Seagrave ..	..	...	.....	Hose
	(Purchased for October Delivery.)				
Des Moines—					
1	Chalmers .	40	694	.....	Chief
Marshalltown—					
1	Kissel	50	...	.....	Comb. H C
Sioux City—					
1	Robinson ..	110	...	.....	Com. P H C

No. in Service.	Make.	Horse Power Rating.	Mileage per Month.	Cost per Mo. Fuel & Oil.	Service.
	KANSAS.				
Atchison—					
1	Webb	90	40	7.00	Comb. P H
1	Webb	90	40	7.00	Com. P H C
Wichita—					
1	Webb	90	...	.....	Pumping
1	Webb	60	...	.....	Chemical
	KENTUCKY.				
Louisville —					
1	American .	60	...	.....	Chief
1	American .	..	...	.....	Mechanic
Newport—					
1	Schacht ...	45	...	.....	Comb. H L
	LOUISIANA.				
Shreveport—					
1	Seagrave ..	52	...	7.00	Chemical
1	Seagrave ..	90	...	6.50	Tractor
1	Martin	45	...	.....	Tractor
	(Made by Knox Co.)				
2	Am. La Fr.	50	...	.....	Comb. P H
1	Am. La Fr.	50	...	.....	Comb. H C
1	Cadillac ...	40	...	.....	Chief
1	Cadillac ...	40	...	.....	Electrician
	MARYLAND.				
Baltimore—					
1	White	40	...	.....	Chief
1	Mack	40	...	.....	Supply
1	White	40	...	.....	Ambulance
1	White	40	...	.....	Mechanic
2	Mack	60	...	.....	Hose
	(High Pressure Service.)				
2	Mack	40	...	.....	Hose
	MASSACHUSETTS.				
Beverly—					
1	Am. La Fr. ..		...	.....	Comb. H C
	(Ordered for Immediate Delivery.)				
Boston—					
1	Columbia ..	..	...	.....	Official
3	Ross	..	...	.....	Official
1	Buick	..	...	.....	Official
1	Cadillac ...	..	...	.....	Official
Brookline—					
1	Knox	..	...	.....	Chief
1	Knox	..	...	.....	Comb. H C
Holyoke —					
1	Knox	60	...	.....	Squad
1	Knox	60	...	.....	Comb. H C
1	Stevens	30	...	.....	Chief
Lynn—					
1	Knox	48	...	.....	Comb. H C
1	Pope-Hart.	40	...	.....	Squad
Melrose—					
1	Knox	..	...	.....	Chemical
Newton—					
1	.....	20	...	.....	Chief
1	.....	30	...	.....	Chief
2	Knox ..	40-50	...	.....	Comb. H C
Pittsfield—					
1	Pope-Hart.	50	...	2.96	Comb. H C
1	Am. La Fr.	50	...	.....	Ladder
Quincy—					
1	Am. La Fr.	40	...		
2	Kissel ...	40-30	...		
1	Ford	22	...		
Salem—					
1	Am. La Fr. ..		...	.....	Comb. H C
	(Ordered for Immediate Delivery.)				
Somerville—					
1	Pope-Hart.	40	...	.....	Comb. H C
1	Cadillac ...	30	...	.....	Chief
1	Pope-Tol. ..	30	...	.....	Chemical
Springfield—					
3	Couple Gear	80	24	6.00	Ladder
2	Knox	60	92	3.60	Squad
1	Martin	45	...	.....	Water Tow.
7	Knox	60	27	1.44	Comb. H C
2	Couple Gear	80	...	.....	Comb H C
	(Electric.)				
5	Knox 24-	45	...	.....	Officials

No. in Service.	Make.	Horse Power Rating.	Mileage per Month.	Cost per Mo. Fuel & Oil.	Service.
1	Knox	16	...	.....	Alarm
1	Knox	40	...	.....	Utility
Taunton—					
1	Pope-Hart.	50	75	3.20	Comb. H C
Worcester—					
1	Pope-Hart.	40	150	3.10	Squad
1	Thomas	40	300	6.00	Chief
		MICHIGAN.			
Battle Creek—					
1	Am. La Fr.	75	35	3.60	Comb. H C
1	Am. La Fr.	105	25	4.50	Com. P C H
1	Jackson	50	325	.....	Chief
Bay City—					
3	.....	..	...		
Detroit—					
1	Seagrave	..	...	.....	Water Tow.
1	Seagrave	..	...	.....	Service
2	Packard	30	...	.....	Squad
4	.....	..	...	.....	Pumping
Flint—					
2	Am. La Fr.	90	...	.....	Pumping
1	Am. La Fr.	60	...	.....	Comb. H C
1	Buick	32	...	.....	Chief
Grand Rapids—					
1	Oldsmobile	60	....	4.02	Chemical
1	Oldsmobile	60	....	3.41	Chemical
1	Seagrave	58	...	2.80	Comb. H C
1	White	60	...	6.32	Comb. H C
1	Overland	30	...	3.06	Chief
1	Reo	12	...	3.76	Alarm
1	Jackson	45	...	.....	Marshal
	(Ordered for Immediate Delivery.)				
Kalamazoo—					
1	Michigan	40	...	.....	Chief
Lansing—					
1	Oldsmobile	60	30	3.00	Comb. H C
1	Webb	90	50	4.15	Pumping
1	Oldsmobile	60	50	4.25	Chemical
1	Oldsmobile	40	200	7.00	Chief
2	Oldsmobile	74	25	3.00	Comb. H C
		MINNESOTA.			
Duluth—					
2	Kissel	40	...	.....	Chief
1	Am. La Fr.	70	...	.....	Comb. H C
1	Am. La Fr.	90	...	.....	Comb. H C
	(Ordered for Immediate Delivery.)				
1	Am. La Fr.	70	...	.....	Salvage
Minneapolis—					
1	Stoddard	..	...	.....	Chief
1	Rambler	..	...	.....	Chief
2	Cole	..	...	.....	Chief
1	Am. La Fr.	..	...	.....	Squad
1	Am. La Fr.	..	...	.....	Comb. H C
2	Seagrave	..	...	.....	Comb. H C
1	Wilcox	..	...	.....	Comb. H C
1	Nott	..	...	.....	Com. P H C
St. Paul—					
1	Cadillac	30	...		
3	Pierce	40	...		
1	Pierce	60	...		
1	.....	..	...	21.70	Alarm
1	.....	40	...	12.75	Chief
1	.....	40	...	14.00	Chief
1	.....	40	...	.....	Chief
1	.....	30	...		
	(Delivered Sept. 1)				
		MISSISSIPPI.			
Jackson—					
1	Seagrave	80	...		
	(In Service Aug. 15.)				
		MISSOURI.			
Joplin—					
1	Webb	90	...	.....	Pumping
3	Webb	60	...	.....	Comb. H C
1	Webb	35	...	.....	Chemical
1	Webb	90	...	.....	Comb. P H
St. Joseph—					
1	Cadillac	30	...	.....	Chief
1	Velie	40	...	.....	Chief
Webb City—					
1	Am. La Fr.	70	60	.....	Comb. H C
1	Oakland	40	20		
	(Comb. Hose and Patrol Car.)				
		MONTANA.			
Butte—					
1	Seagrave	80	...	.....	Squad
1	Seagrave	80	...	.....	Comb. H C
	(Both cars ordered, not yet in service)				
		NEBRASKA.			
Omaha—					
1	Stearns	30	...	.....	Chief
1	Seagrave	80	...	.....	Comb. H C
1	Knox	60	...	.....	Comb. H C
		NEW JERSEY.			
Atlantic City—					
2	Nyburg	40	...	.....	Chief
1	Oldsmobile	40	...	.....	Chief
1	Buick	..	...	.....	Alarm
New Brunswick—					
1	Robinson	..	...	.....	Service
	(Ordered for Immediate Delivery.)				
Orange—					
1	.....	..	...	.....	Chemical
Passaic—					
1	Webb	50	...	1.75	Comb. P H
4	Knox	40	...	2.00	Comb. H C
1	Pope-Hart.	..	...	2.00	Comb. H C
1	Thomas	50	...		
1	Seagrave	80	...	4.00	Ladder
1	Seagrave	90	...	4.00	
1	Buick	30	350	10.00	Chief
1	Ford	18	125	5.00	
Trenton—					
2	Webb	60-90	...	13.00	Comb. P H
1	Stanley	30	...	4.50	Comb. H C
	(Steam Power.)				
1	Stanley	30	...	6.00	Chief
	(Steam Power.)				
1	Thomas	48	...	7.00	Supply
		NEW MEXICO.			
Albuquerque—					
1	Am. La Fr.	90	12	.....	Comb. P H
		NEW YORK.			
Auburn—					
3	.....	..	...		
Dunkirk—					
1	Am. La Fr.	48	...	5.40	
Middletown—					
2	.....	40-60	200	20.00	Com. P C H
Mt. Vernon—					
1	White	40	20	1.75	Comb. H C
1	White	..	...		
	(Same as above has been ordered.)				
Newburgh—					
1	Chemical	..	...		
New Rochelle—					
1	Am. La Fr.	90	...	4.00	Pumping
1	Knox	45	...	4.00	Chemical
1	Knox	45	...	.....	Squad
Nyack—					
1	Stearns	60	...	5.00	Comb. H C
Poughkeepsie—					
1	Kanawha	30	81	2.50	
Rochester—					
1	.....	..	...	.....	Comb. H C
5	.....	..	...	.....	Chief
Watertown—					
1	Am. La Fr.	90	...	.....	Com. P C H
1	Franklin	25	500	4.25	
Yonkers—					
2	Boyd	60	80	.....	Comb. H C
1	Webb	90	80	.....	Pumping
		NORTH CAROLINA.			
Asheville—					
2	Seagrave	80	100	5.00	Comb. H C
Charlotte—					
1	Knox	..	...	.....	Comb. H C

No. in Service.	Make.	Horse Power Rating.	Mileage per Month.	Cost per Mo. Fuel & Oil.	Service.
Durham—					
1	Webb	60	...		
Wilmington—					
2	Am. La Fr.	48	...		
	(In Service Sept. 15.)				
Winston—					
1	Am. La Fr.	100	...		
	(Not yet in Service.)				
	OHIO.				
Alliance—					
1	Robinson ..	70	50	3.50	Pumping
1	Sampson ..	60	50	3.50	Comb. P H
1	Chalmer ...	40	150	5.00	Squad
1	Excelsior ..	4	200	1.00	Motorcycle
Ashtabula—					
1	.....	..	...	.....	Pumping
1	.....	..	...	.....	Hose
1	.....	..	...	.....	Chemical
Lakewood—					
1	Am. La Fr.	102	...	.....	Pumping
Lorain—					
1	Seagrave ..	90	30	.....	Ladder
1	Seagrave ..	90	30	.....	Ladder
Mansfield—					
1	Seagrave ..	..	...	.....	Comb. H C
Toledo—					
1	Overland ..	45	666	14.00	Chief
1	Overland ..	30	75	4.00	Chief
Zanesville—					
1	Am. La Fr.	90	...	.....	Pumping
1	Seagrave ..	79	...	.....	Comb. H C
	(Both Cars to be put in service Oct 1.)				
	PENNSYLVANIA.				
Bradford—					
1	Garford ...	60	100	14.00	Chemical
Johnstown—					
1	.....	..	...	.....	Chief
1	.....	..	...	.....	Chemical
New Castle—					
1	Knox	60	50	6.50	Chemical
1	Knox	70	40	5.00	Com. P C H
Philadelphia—					
1	Webb	..	...	.....	Ladder
1	Couple-Gear	(Electr		.....	Water Tow.
1	Mack	..	...	.....	Comb. H C
2	Boyd	..	...	.....	Comb. H C
5	Cole	40	...	.....	Engineers
6	Ford	18	...	.....	Engineers
1	White	60	...	.....	Chief
1	Mack	..	...	.....	Emergency
(Above cars ordered but not yet Delivered.)					
Pittsburg—					
1	Christie ...	..	...	.....	Tractor
4	Am. La Fr.	..	...	.....	Comb. H C
4	Knox	..	...	.....	Comb. H C
1	Webb	..	...	.....	Comb. H C
Scranton—					
1	Buick	30	...	.....	Squad
3	Am. La Fr.	..	...	.....	Comb. H C
	(Ordered but not delivered.)				
Wilkinsburg—					
1	Knox	40	...	.....	Comb. H C
1	Am. La Fr.	60	...	.....	Comb. H C
	RHODE ISLAND.				
Pawtucket—					
1	Webb	..	...	.....	Pumping
1	.....	..	...	.....	Chief
	TENNESSEE.				
Chattanooga—					
1	.....	..	...	.....	Comb. H C
Nashville—					
3	Am. La Fr.	95	...	.....	Com. P C H
	(Put in Service during Sept.)				
2	Marathon ..	35	480	10.00	Chief
	TEXAS.				
Austin—					
1	Webb	78	...	.....	Comb. H C
1	Reo	30	...	.....	Chief
1	Rambler ...	40	...	.....	Marshal
Dallas—					
3	.....	..	...	.....	Pumping
2	.....	..	...	.....	Comb. H C
1	.....	..	...	.....	Chief
1	.....	..	...	.....	Electrical
El Paso—					
2	.....	..	...		
Fort Worth—					
1	Am La Fr.	..	...	.....	Comb. H C
1	Webb	..	...	.....	Comb. H C
	UTAH.				
Ogden—					
1	Stoddard ..	30	...	6.00	Squad
	VIRGINIA.				
Roanoke—					
3	Seagrave ..	80	40	5.60	Comb. H C
	WASHINGTON.				
Bellingham—					
1	Ford	18	230	15.00	Chief
Seattle—					
2	Waterous ..	101	...	.....	Hose
1	Seagrave ..	80	33	4.27	
1	Seagrave ..	90	1266	3.10	
	(Tractor attached to 85-ft. Aerial Tr.)				
1	Waterous ..	101	...	.....	Comb. H C
1	Seagrave ..	80	2366	3.12	
1	Seagrave ..	80	4505	5.10	
1	Chase	20	...	.....	Truck
2	Indian	705	...	.....	Alarm
	(Motorcycles.)				
2	Cadillac ..	32	736	14.94	Chief
1	Pope-Hart.	..	...	.....	Chief
1	Autocar ...	..	...	.....	Chief
Tacoma—					
1	Seagrave ..	..	...	.....	Hose
1	Seagrave ..	..	...	.....	Ladder
4	Seagrave ..	..	...	.....	Comb. H C
1	Seagrave ..	..	...	.....	Com. P C H
2	Stoddard ..	..	...	.....	Chief
Walla Walla—					
1	Seagrave ..	80	40	6.00	
	WEST VIRGINIA.				
Charleston—					
1	Kanawha .	32	...	5.00	Chemical
	WISCONSIN.				
Beloit—					
1	Am. La Fr.	60	...	.....	Comb. H C
Eau Claire—					
1	Harder ...	70	...(recently installed)		
Kenosha—					
2	.....	50	12	1.70	Comb. H C
Superior—					
1	Studebaker	20	...	7.00	Chief
1	Thomas ...	60	...	4.00	Comb. H C
1	Seagrave ..	80	...	5.00	Tractor

POLICE DEPARTMENT MOTORS.

No. in Service.	Make.	Horse Power Rating.	Mileage per Month.	Cost per Mo. Fuel & Oil.	Service.
	ALABAMA.				
Mobile—					
1	.....	..	...	.....	Patrol
Montgomery—					
2	Har-Dav. ..	4	...		
	CALIFORNIA.				
Alameda—					
1	Pope-Hart.	..	...	.....	Patrol
1	Indian (c).	..	...	.....	Emergency
Berkeley—					
1	Pope-Hart.	40	...	.....	Comb. P A
1	Excels'r (c)	..	...	.....	Patrol
1	Thor (c)...	..	...	.....	Emergency
6	(Cycles, to be purchased Oct. 1.)				
Pasadena—					
1	Hudson ...	..	...	.....	Patrol
3	Indian (c).	..	...		
San Diego—					
1	Cadillac ..	30	...	.....	Emergency
5	Excels'r (c)	7	...		
San Francisco—					
2	Knox	..	...	.....	Patrol
5	(Cycles) ..	..	...	.....	Park
1	Peerless ...	..	...	.....	Chief
1	Peerless ...	..	...	.....	Detectives
San Jose—					
1	Indian	6	...	$5.00	Patrol
	COLORADO.				
Colorado Springs—					
1	Ford	20	...	20.00	Chief
2	Indian (c).	7	...	.....	Speeders
	CONNECTICUT.				
Hartford—					
2	Pope-H't.	35-45	863	.....	Patrol
1	Pope-Hart.	35	212	.....	Ambulance
3	Indian (c).	..	750	.....	Patrol
1	Pope (c)...	..	...	.....	Patrol
New Haven—					
1	White	30	641	11.98	Patrol
Stamford—					
1	Pope-Hart.	50	263	10.50	Comb. P A
	DISTRICT OF COLUMBIA.				
Washington—					
1	Franklin ..	..	...		
	FLORIDA.				
Tampa—					
1	.....	..	...	.....	Comb. P A
1	.....	..	...	.....	Chief
	GEORGIA.				
Augusta—					
1	Lozier	51	831	27.00	Patrol
3	Reading (c)	5	...		
1	Excels'r (c)	305	100	10.00	
Rome—					
1	Hudson	30	...	.....	Patrol
	ILLINOIS.				
Chicago—					
9	Cy. of Chi..	50	...	.....	Patrol
15	Excels'r (c)	4	1200	12.50	
12	Excels'r (c)	7	...		
1	Staver	35	...	.....	Chief
1	Royal	35	...	.....	Chief
1	Ford	20	...	.....	Chief
Kankakee—					
1	Buick	22	10	75.00	Patrol
Oak Park—					
1	White	..	...	.....	Ambulance
Peoria—					
1	Glide	..	...	.....	Patrol
1	Glide	..	...	.....	Ambulance
Quincy—					
1	Pierce (c)..	4	...		
Rockford—					
2	(Cycles)	..	.		
	INDIANA.				
Elkhart—					
1	Crow	35	...	.....	Comb. P A
Fort Wayne—					
1	Auburn	..	500	16.55	Patrol
1	Indian (c).	..	...	10.00	
Hammond—					
1	Rapid	30	...	18.00	Patrol
1	Indian (c).	4	...	7.00	Patrol
Indianapolis—					
2	Packard ...	..	...	.....	Patrol
1	Rapid	..	...	.....	Patrol
1	Premier ...	..	...	.....	Detective
1	.....	..	...	.....	Alarm
South Bend—					
1	Studebaker	40	375	.....	Ambulance
1	Pierce	60	300	.....	Auxiliary
1	Har.-Dav ..	8	2000	.....	Patrol
Terre Haute—					
1	Pierce	48	430	17.00	Patrol
2	Indian (c).	4	275	3.00	Speeders
	IOWA.				
Davenport—					
1	Meteor	50	...	....	Patrol
Des Moines—					
1	White	30	...	.....	Comb. P A
1	Cadillac ...	30	...	.....	Officials
Marshalltown—					
1	Kissel	50	...	.....	Comb. P A
Sioux City—					
1	Cadillac ...	30	...	.....	Patrol
	KANSAS.				
Wichita—					
1	Cadillac ...	30	...		Squad
1	Indian (c).	..	...		
	KENTUCKY.				
Louisville—					
3	Oldsmobile	..	...	.....	Patrol
1	Cadillac ...	..	...	.....	Patrol
3	Cadillac ...	..	...	.....	Officials
1	Autocar ...	..	...	....	Detective
	MASSACHUSETTS.				
Beverly—					
1	Yale (c)...	..	...	.....	Patrol
Boston—					
1	Columbia ..	..	...	.....	Official
5	Ross	..	...	.....	Official
1	Ford	..	...	.....	Official
1	White	..	...	.....	Patrol
Brookline—					
1	Marmon ...	..	...	.....	Official
Holyoke—					
1	Knox	40	150	5.57	Patrol
1	Indian (c).	7	2000	2.00	
Lynn—					
2	Knox	40	...	.....	Ambulance
2	Indian (c).	5	...		
Newton—					
1	Ross	..	...	.....	Chief
1	.....	..	...	.....	Comb. P A
Quincy—					
1	Knox	30	...	.....	Patrol
Somerville—					
1	White	40	...	.....	Comb. P A
1	Indian	7	...		
Springfield—					
2	Knox	20-40	800	25.00	Patrol
2	Knox	20-40	800	25.00	Ambulance
Worcester—					
2	White	40	962	.....	Patrol
1	White	40	1042	.....	Ambulance
4	Marsh-Metz	4.5	1250	8.46	Cycle
1	White	30	99	.....	Official

No. in Service.	Make.	Horse Power Rating.	Mileage per Month.	Cost per Mo. Fuel & Oil.	Service.
MICHIGAN.					
Battle Creek—					
1	Jackson	50	400	.....	Comb. P A
Bay City—					
1	.....	..	...	.....	Patrol
Flint—					
1	Buick	32	...	.....	Patrol
1	Excels'r (c)	4	...	.....	Sanitary
Grand Rapids—					
1	Oldsmobile	60	...	.....	Comb. P A
1	Reo	30	...	.....	Patrol
1	Chase	20	...	.....	Sealer
2	Indian (c).	7	...		
2	Indian (c).	4	...		
Kalamazoo—					
1	Michigan ..	40	...	.....	Chief
1	Oldsmobile	60	...	.....	Comb. P A
Lansing—					
1	.....	60	900	20.00	Patrol
MINNESOTA.					
Duluth—					
1	Franklin ..	60	...	.....	Emergency
1	Kato	60	...	.....	Patrol
Minneapolis—					
3	Rambler		...	.....	Patrol
1	Rambler		...	.....	Ambulance
1	Rambler		...	.....	General
6	Thor (c)... ..		...		
St. Cloud—					
1	Pierce (c).	4.5	250	.....	Chief
St. Paul—					
1	White		...	.....	Squad
3	(Cycles)		...	.....	Patrol
MISSOURI.					
Joplin—					
1	Forsythe ..	10	...	.....	Patrol
St. Joseph—					
1	Peerless ...	40	...	.....	Comb. P A
Webb City—					
1	Oakland ...	40	20		
	(Used as Patrol & Hose Car.)				
NEBRASKA.					
Omaha—					
1	Inter-State	40	...	.....	Patrol
2	Franklin ..	60	...	.....	Patrol
NEW JERSEY.					
Atlantic City—					
1	Electric		...	.....	Patrol
1	Oldsmobile	40	...	.....	Patrol
1	Indian (c). ..		...		
1	Merkel (c). ..		...		
Passaic—					
1	Cadillac ...	40	465	12.00	Comb. P A
1	Indian (c).	4	900	4.50	Patrol
Perth Amboy—					
1	Indian (c).	7	900	.....	Patrol
Trenton—					
1	Thomas ...	48	250	30.00	Comb. P A
1	Indian (c).	7	...	.....	Patrol
NEW YORK.					
Auburn—					
1	.....	..	...	.....	Patrol
Dunkirk—					
1	White	30	...	2.15	Comb. P A
1	Thor (c)...	4	...	3.15	Patrol
Middletown—					
1	(Cycle)		...	.....	General
Mt. Vernon—					
2	(Cycle) ...	4	...	.....	Patrol
2	(Cycle) ...	6	...	.....	Patrol
	(72,000 Miles at cost of $11.40.)				
Poughkeepsie—					
1	White	30	...	.....	Patrol
Rochester—					
2	Autos		...	.....	Patrol
1	Auto		...	.....	Chief
8	(Cycle)		...	.....	Patrol
Watertown—					
1	Har-Dav. ..	7	1200	3.94	Cycle
NORTH CAROLINA.					
Asheville—					
1	Chase	30	250	15.00	
OHIO.					
Alliance—					
1	Argo (Elec) ..		70	0.25	Comb. P A
1	....		...		
Dayton—					
1	Speedwell .	50	1500	.....	Patrol
1	Speedwell .	50	1500	60.00	Ambulance
6	Merkle (c) ..		1200	50.00	Patrol
Lorain—					
1	Indian	7	200	2.50	Emergency
Toledo—					
12	(Cycle) ...	7	4680	26.00	
PENNSYLVANIA.					
Erie—					
1	Oakland ..	30	...	.....	Patrol
1	Indian (c). ..		...	.....	General
1	Thor (c). ..		...	.....	General
Harrisburg—					
1	Rambler		...	.....	Comb. P A
Johnstown—					
1	Auto		...	.....	Patrol
New Castle—					
1	Auto		...	.....	Chief
	(Ordered for Immediate Delivery.)				
Philadelphia—					
1	Knox		...	.....	Patrol
5	(Generals Motor Co.			.....	Patrol
50	Indian (c). ..		...	.....	Patrol
	(Ordered for Delivery soon.)				
Pittsburg—					
11	White		...	.....	Patrol
12	Indian (c). ..		...	.....	Patrol
2	Staver (c) ...		...	.....	Patrol
1	Pierce (c). ..		...	.....	Patrol
RHODE ISLAND.					
Pawtucket—					
1	Cadillac ...	32	315	.....	Comb. P A
2	M.&M. (c).	253	...	.....	Traffic
TENNESSEE.					
Chattanooga—					
1	Auto		...	.....	Patrol
1	Auto		...	.....	Chief
Nashville—					
1	White	40	1100	33.00	Patrol
1	White	40	950	27.50	
TEXAS.					
Austin—					
2	Indian (c).	7	...	.....	General
Dallas—					
1	Auto		...	.....	Chief
1	Auto		...	.....	Patrol
1	Auto		...	.....	Comb. P A
Fort Worth—					
1	Rambler		...	.....	Patrol
1	Selden		...	.....	Ambulance
1	Indian (c). ..		...	.....	General
WASHINGTON.					
Seattle—					
1	Stev.-Dur. .	60	1000	.....	Official
1	Studebaker	40	1000	.....	Official
1	Knox	30	300		
5	Indian (c).	7	4000	.....	Patrol
Tacoma—					
1	Stoddard		...	.....	Comb. P A
4	Indian (c). ..		...	.....	Speeders
WISCONSIN.					
Green Bay—					
1	Indian (c). ..		...	.....	Patrol
Superior—					
1	Seagrave ..	54	...	6.50	

PUBLIC WORKS DEPARTMENT MOTORS.

No. in Service.	Make.	Horse Power Rating.	Mileage per Month.	Cost per Mo. Fuel & Oil.	Service.
	ALABAMA.				
Montgomery—					
1	White	30	...	.....	Engineer
	CALIFORNIA.				
Alameda—					
1	Regal	30	...	.....	Street Supt.
Berkeley—					
2	Auto	..	...	.....	Street Supt.
Pasadena—					
1	Maxwell	..	...	.....	Engineer
1	Maxwell	..	...	10.55	Supt.
1	Brush	..	...	9.82	Supt.
1	Maxwell	..	...	11.33	Foreman
Redlands—					
1	Mitchell	30	...	.....	Street
1	Mitchell	30	...	.....	Water
San Diego—					
1	Maxwell	16	...	.....	Water
1	Metz	20	...	.....	Repair
3	Excels'r (c)	4	...	.....	Meter
1	Buick	40	...	.....	Street
1	Maxwell	16	...	.....	Street
1	Briggs	30	...	.....	Sweeper
1	Maxwell	16	...	.....	Inspection
1	Maxwell	24	...	.....	Repair
1	Buick (tr'k)	20	...	.....	Repair
1	Kissel	30	...	.....	Repair
1	Excels'r (c)	4	...	.....	Electrical
1	Maxwell	16	...	.....	Electrical
1	Studebaker	20	...	.....	Gas
2	Excels'r (c)	4	...	.....	Building
1	Maxwell	16	...	.....	Inspection
San Francisco—					
1	Peerless	..	...	.....	Commis'rs
San Jose—					
1	Studebaker	30	...	.....	Engineer'g
	CONNECTICUT.				
Hartford—					
2	Ford	22	2000	.....	Street Supt.
New Haven—					
1	Overland	..	...	.....	Engineer
1	Overland	..	...	.....	Official
1	Hudson	..	...	.....	Official
	FLORIDA.				
Tampa—					
1	Auto	..	...	.....	Electrical
	GEORGIA.				
Atlanta—					
2	Auto	..	...		
Augusta—					
1	Overland	30	900	15.00	Supt. Sts.
1	Ford	20	900	.....	Engineer
	ILLINOIS.				
Peoria—					
2	Indian (c)	..	...	.....	General
	INDIANA.				
Indianapolis—					
1	Premier	40	...	.....	Board
1	Penn	30	...	.....	Street Supt.
1	Buick	18	...	.....	Streets
1	Chalmers	30	...	.....	Engineers
1	Chalmers	30	...	.....	Inspection
2	Reo	24	...	.....	Engineers
2	Reading (c)	5	...	.....	Inspection
1	R. C. H.	25	...	.....	Asphalt
1	Buick	18	...	.....	Street
1	Reo	24	...	.....	Street
1	Buick	18	...	.....	Chemist
Terre Haute—					
1	Thor (c)	5	270	2.85	Inspection
	IOWA.				
Des Moines—					
1	Marion	40	...	.....	Official
Sioux City—					
1	Krit	..	...	.....	Engineer
1	Ford	..	...	.....	Street Supt.
1	Ford	..	...	.....	Water Wks
1	Ford	..	...	.....	Inspection
	KANSAS.				
Wichita—					
1	Indian (c)	..	...	.....	Engineer
	MASSACHUSETTS.				
Brookline—					
1	Pope Hart. (Rented)			.....	Building
1	Cadillac	..	...	.....	Water
1	Maxwell (Rented)			.....	Engineer
1	Johnson	..	...	.....	Electrical
1	Johnson (tr'k).		...	.....	Emergency
2	Buick	..	...	.....	Highway
Boston—					
1	Carter	..	...	.....	Bridges
1	Columbia	..	...	.....	Bridges
1	Maxwell	..	...	.....	Bridges
2	Stev.-Dur.	..	...	.....	Highway
2	Columbia	..	...	.....	Highway
2	Oakland	..	...	.....	Highway
2	Metz	..	...	.....	Highway
1	Rambler	..	...	.....	Highway
1	Cadillac	..	...	.....	Highway
1	Carter	..	...	.....	Highway
1	Pope	..	...	.....	Sewer
1	Rec	..	...	.....	Sewer
1	Overland	..	...	.....	Sewer
5	White (Including 2 trucks)	..	...	.....	Water
1	Corbin	..	...	.....	Water
1	Carter	..	...	.....	Water
1	Cadillac	..	...	.....	Water
Cambridge—					
1	Auto	..	...	.....	Electrical
1	Auto	..	...	.....	Water
Holyoke—					
1	Knox	38	500	.....	Electrical
1	Buick	24	...	.....	Gas
1	Elmore	32	500	5.25	Engineer
1	Elmore	50	1000	31.50	Building
1	Buick	30	890	7.35	Supt.
Lynn—					
1	Studebaker	20	...	.....	Engineer
1	Federal (tk)	30	...	.....	General
2	Ford	22	...	.....	Official
Newton—					
1	Studebaker	20	...	.....	Official
Pittsfield—					
1	Berkshire	36	600	20.00	Engineer
Quincy—					
4	Ford	22	...	.....	General
Somerville—					
1	Ford	22	...	.....	Highway
1	Studebaker	20	...	.....	Electrical
Springfield—					
2	Auto (Contracted for			.....	Sprinking
1	(Cycle)	..	...	.....	Street
2	Auto	10	700	.....	Street Supt.
1	Auto	30	...	.....	Official
	MICHIGAN.				
Grand Rapids—					
1	Ford	20	...	.....	Street
	MINNESOTA.				
Duluth—					
1	Studebaker	40	...	.....	Official
1	Mitchell	60	...	.....	Inspection
Minneapolis—					
1	Buick	..	...	.....	Bridge
1	Buick	..	...	.....	Paving
1	Velie	..	...	.....	Sewers

No. in Service.	Make.	Horse Power Rating.	Mileage per Month.	Cost per Mo. Fuel & Oil.	Service.
1	Mitchell				Water
1	Hudson				Engineer
2	Reliance (tr'k)				Sewer
1	Ford				Electrical
1	Buick				Street
1	Van Dyke				Water
1	Maxwell				Gas
St. Paul—					
(All cars for this department are rented.)					
NEBRASKA.					
Omaha—					
1	Stoddard	40			Official
1	Hudson	20			Street
1	National	40			Board
NEW JERSEY.					
Orange—					
1	Auto				Water
1	Auto				Electrical
Passaic—					
1	Ford	30	250	10.00	Engineer
Trenton—					
1	Ford	22	400	5.00	Engineer
1	Ford	22	1100	11.00	Official
1	Ford	22	600	20.00	Building
NEW YORK.					
Auburn—					
2	Auto				General
Mt. Vernon—					
1	Buick		1404		Commiss'er
OHIO.					
Lima—					
1	Auto				Official
Toledo—					
2	Gramm (tk)				General
1	Overland	24	600	8.60	Engineer
3	Indian (c)	7	3800	22.50	Inspection
PENNSYLVANIA.					
Philadelphia—					
1	Knox	40			
2	Cole	30			
2	Locomobile	30			
1	Garford	50			
5	Ford	30			
Pittsburg—					
4	Auto				Engineer
3	Alco				Street
(Trucks, 7½ Tons Each.)					
Scranton—					
1	Oakland	30			Director
RHODE ISLAND.					
Pawtucket—					
1	Gramm	36		21.32	Street
1	Studebaker	30	1083	21.48	Official
SOUTH DAKOTA.					
Aberdeen—					
1	Ford	20			Street Supt.
1	Ford	20			Engineer
TENNESSEE.					
Chattanooga—					
1	Truck				Scavenger
Nashville—					
1	Marathon	35	850	12.00	Inspection
1	Marathon	35	900	12.00	Supt.
1	Marathon	35	900	11.75	Street
TEXAS.					
Dallas—					
1	Auto				Engineer
Fort Worth—					
1	Marmon	30			Engineer
1	Cadilac				Engineer
1	Buick				Engineer
VERMONT.					
Rutland—					
1	Mack	40			Highway
(7 tons.)					
WASHINGTON.					
Seattle—					
1	Cadillac	30	500	25.00	Engineer
1	Franklin	20	250	25.00	Engineer
(Cost includes $15.00 Garage Charges.					
Tacoma—					
1	Merkle (c)	7			Engineer
1	Buick				Commiss'er
1	Reo				Street Supt.

HEALTH DEPARTMENT MOTORS.

CALIFORNIA.					
Alameda—					
1	(Cycle)				Sanitary
Berkeley—					
1	Pope-Hart.				
(To be purchased.)					Ambulance
Pasadena—					
1	Buick				
(Rented.)					Inspection
1	Brush				Inspection
Redlands—					
1	Regal	30			Inspection
San Diego—					
1	Cadillac				Inspection
San Francisco—					
1	Pope-Hart.				Ambulance
1	Haynes				Official
1	Velie				Hospital
COLORADO.					
Colorado Springs—					
1	Thor (c)				Inspection
CONNECTICUT.					
Hartford—					
1	Maxwell	28	800		Inspection
1	Ford	18	1000		Inspection
1	Studebaker	28	1200		Inspection
(Privately owned, loaned to the City.)					
New Haven—					
1	Buick	25	1500		Inspection
GEORGIA.					
Atlanta—					
2	Trucks				Garbage
2	Autos				Inspection
ILLINOIS.					
Chicago—					
1	Kissel	45	1950	28.89	Ambulance
1	Oldsmobile	40	1950	28.89	Ambulance
1	Buick	25	100	2.30	
INDIANA.					
Indianapolis—					
1	Waverly (electric)				Ambulance
1	Buick				Ambulance
Terre Haute—					
1	Indian	4	320	3.25	Inspection
KANSAS.					
Wichita—					
1	Indian (c)				Inspection

No. in Service.	Make.	Horse Power Rating.	Mileage per Month.	Cost per Mo. Fuel & Oil.	Service.
MASSACHUSETTS.					
Brookline—					
1	Cun'ngham	..	...	.....	Ambulance
1	Cadillac	... ..	...	.....	Ambulance
Boston—					
2	Buick	....	...	.....	Official
2	Stev.-Dur.	. ..	...	.....	Official
1	Electric	... ..	...	.....	Ambulance
4	Autocar	... ..	...	.....	Ambulance
Lynn—					
1	Flanders	.. 20	...	.....	Board
Newton—					
1	Stoddard	.. 28	...	.....	Official
Springfield—					
1	Ford	 20	...	.....	Inspection
MICHIGAN.					
Flint—					
1	Indian (c).	7	...	.....	Inspection
Grand Rapids—					
1	Auto	....	...	.....	Ambulance
	(Privately owned, rented by City.)				
1	Auto	....	...	.....	Official
	(Privately owned, rented by City.)				
1	Indian (c).	4	...	.....	Inspection
MINNESOTA.					
Minneapolis—					
1	Ford	....	...	.....	Inspection
NEW JERSEY.					
Passaic—					
1	Ford	 30	200	7.50	Inspection
Trenton—					
1	Stanley	... 10	1000	20.00	Crematory
2	Ford	 22	1000	20.00	Inspection
OHIO.					
Toledo—					
1	Kelly (tr'k)	30	1800	27.50	Garbage
PENNSYLVANIA.					
Philadelphia—					
1	Electric	... ..	...	.....	Ambulance
1	White	....	...	.....	Ambulance
1	Knox (tr'k)	..	...	.....	Supply
	(Ordered for Delivery soon.)				
TENNESSEE.					
Chattanooga—					
1	Auto	....	...	.....	Inspection
Nashville—					
1	Marathon	.. 35	500	9.40	Disinfection
TEXAS.					
Austin—					
1	Ford	 20	...	.....	Inspection
1	Hupmobile	. 20	...	.....	Inspection
Dallas—					
1	Auto	....	...	.....	Official
1	Auto	....	...	.....	Chemist
Fort Worth—					
2	Ford	....	...	.....	Inspection
1	Maxwell	... ..	...	.....	Inspection
WASHINGTON.					
Seattle—					
1	Pierce (t'k)	30	1200	.....	Garbage
1	Buick	 30	2111	17.00	Official
1	Everett	... 30	466	.....	Official
1	Everett	... 30	383	.....	Official
1	New Era (c)	..	...	.....	Inspection
Tacoma—					
1	Merkel (c).	7	...	.....	Inspection

PARK DEPARTMENT MOTORS.

No. in Service.	Make.	Horse Power Rating.	Mileage per Month.	Cost per Mo. Fuel & Oil.	Service.
CALIFORNIA.					
Pasadena—					
1	Indian (c).	..	...	.....	Inspection
San Francisco—					
1	Oldsmobile	..	...	.....	Commiss'er
COLORADO.					
Colorado Springs—					
1	Indian (c).	3	...	.....	Inspection
1	Cadillac	... 30	...	.....	Commiss'er
CONNECTICUT.					
Hartford—					
2	Coldwell	.. 10	...	$20.00	
	(Rollers.)				
2	Ford	 20	1200	15.00	Supt.
New Haven—					
1	Hudson	... 20	1000	17.25	Supt.
GEORGIA.					
Augusta—					
1	Ford	 20	900	.....	Supt.
ILLINOIS.					
Chicago—					
2	Oldsmobile	40	...	.....	Commiss'er
1	Cadillac	... 30	...	.....	Secretary
1	Cadillac	... 30	...	.....	Supt.
1	Ford	 20	...	.....	Police
1	Ford	 18	...	.....	Foreman
1	Oldsmobile	20	...	.....	Electrician
1	Buick (t'k)	22	...	.....	General
1	Overland	.. 30	2000	30.00	Official
2	Hardy (Spraying Machines.)				
INDIANA.					
Indianapolis—					
1	Overland	.. 30	...	.....	Official
Terre Haute—					
1	Indian (c).	4	225	2.30	Supt.
IOWA.					
Des Moines—					
1	Marion	 40	...	.....	Official
Sioux City—					
1	Indian (c).	4	...	.....	Supt.
MASSACHUSETTS.					
Boston—					
1	Metz	....	...		
1	Grout Stm.	..	...		
3	Columbia	.. ..	...		
1	White	.... ..	...		
1	Packard	... ..	...		
	(3-ton Truck.)				
1	Buick	....	...	.....	Bath
1	Buick (t'k).	..	...	.....	Bath
1	White	.... ..	...	.....	Bath
1	Welch	.... ..	...	.....	Bath
1	Studebaker	..	...	.....	Cemetery
Brookline—					
1	Studebaker	20	...	.....	Trees
	(Rented.)				
Cambridge—					
1	Auto	....	...	.....	Supt.
Newton—					
1	Maxwell	... 22	...	.....	General
MICHIGAN.					
Flint—					
1	Indian (c).	4	...	.....	Supt.
Grand Rapids—					
1	Excels'r (c)	7	...	.....	Supt.
MINNESOTA.					
Minneapolis—					
2	Buick	....	...	.....	Supt.
1	Buick (t'k).	..	...	.....	Repairs

No. in Service.	Make.	Horse Power Rating.	Mileage per Month.	Cost per Mo. Fuel & Oil.	Service.
1	Schurmeier (Truck.)	..	...	.....	Repairs
2	Auto ..... (Rented from Employees.)	..	...	.....	General
2	Indian (c).	..	...	.....	Police
2	Marcel (c).	..	...	.....	Police
1	Isol (c)....	..	...	.....	Playground
1	Indian (c).	..	...	.....	Forester
St. Paul—					
1	Haynes	40	...	30.50	Supt.
1	Wagner (c)	3	...	3.00	Police
2	Packard ...	30	...	31.50	Sightseeing
	NEBRASKA.				
Omaha—					
1	Cadillac ...	40	...	.....	General
	OHIO.				
Toledo—					
1	Oakland ...	30	875	10.75	Supt.

No. in Service.	Make.	Horse Power Rating.	Mileage per Month.	Cost per Mo. Fuel & Oil.	Service.
	PENNSYLVANIA.				
Philadelphia—					
1	Winton	50	...	.....	General
Pittsburg—					
1	Franklin		...	.....	Official
	TENNESSEE.				
Chattanooga—					
1	Auto		...	.....	General
	TEXAS.				
Dallas—					
1	Auto		...	.....	Supt.
Fort Worth—					
1	Jackson		...	.....	Supt.
	WASHINGTON.				
Seattle—					
1	Winton	40	...	32.27	Official
1	Ford	20	1200	20.86	Official
2	Caldwell Automowers				

MOTORS FOR GENERAL USE.

	ALABAMA.				
Montgomery—					
1	White	30	...	.....	Official
1	Mitchell ...	20	...	.....	Water
	CALIFORNIA.				
Alameda—					
1	White	30	...	.....	Lighting
1	Buick		...	.....	Lighting
Pasadena—					
1	Ford	20	...	.....	Plumbing
1	Maxwell ...	20	...	.....	Building
San Francisco—					
1	Peerless		...	.....	Supervisors
2	Brush		...	.....	Lighting
2	Studebaker ..		...	.....	Lighting
1	Pope-Hart. ..		...	.....	School
1	Peerless		...	.....	Mayor
1	Studebaker ..		...	.....	School
	COLORADO.				
Colorado Springs—					
2	Indian (c).	4	...	.....	Water
	CONNECTICUT.				
Hartford—					
1	Pope-Hart.	45	1200	.....	Water
New Haven—					
1	Buick	25	600	.....	Building
Norwich—					
1	Auto		...	.....	General
	GEORGIA.				
Augusta—					
1	(Cycle, used by Secretary to the Mayor)				
	ILLINOIS.				
Peoria—					
1	Glide		...	.....	Fire Marsh'l
Rockford—					
1	Auto		...	.....	Water
	INDIANA.				
Indianapolis—					
1	Truck		...	.....	School
	MASSACHUSETTS.				
Beverley—					
1	White		...	.....	Water
Boston—					
1	Columbia		...	... ..	Building
1	Knox		...	.....	Mayor
1	Columbia		...	.....	Official
1	White		...	.....	Official
1	Pierce		...	.....	Building
1	Buick		...	.....	School
1	Westcott		...	.....	School
1	Carter		...	.....	School
1	Overland		...	.....	School
1	White (t'k) ..		...	.....	School
1	Buick		...	.....	Electrical
1	Carter		...	.....	Electrical
Holyoke—					
1	Knox	40	800	26.00	
Lynn—					
1	Ford	22	...	.....	Building
Springfield—					
1	Knox	50	450	8.45	Lighting
Worcester—					
3	Buick ..... (Used by Street, Water & Sewer Departments for Inspection.)	32	3000		
	MICHIGAN.				
Flint—					
1	Indian (c).	7	...	.....	Lighting
Lansing—					
2	Reo	30	300	.....	Lighting
	MINNESOTA.				
Minneapolis—					
1	Ford		...	.....	School
1	Overland		...	.....	Building
	NEW JERSEY.				
Trenton—					
1	Buick ..... (Used by Inspectors of Weights and Measures.)	14	300	6.00	
1	Warren ...	27	...	12.00	Water
1	Gramm ...	30	...	15.00	Water
1	Ford	22	600	20.00	Building
	NEW MEXICO.				
Albuquerque—					
1	Hupmobile .	20	1500	15.00	Official
	NEW YORK.				
Poughkeepsie—					
1	Mack (tr'k)	35	...	.....	Water
Rome—					
1	Buick		...	.....	Water
	OHIO.				
Toledo—					
1	Cadillac ...	10	285	9.60	Cemetery
1	Overland ..	30	1400	24.60	Official
1	Overland ..	24	1500	20.50	Harbor
1	Overland ..	30	3000	42.90	Water
1	Overland ..	24	900	16.20	Water
1	Ras'll (t'k)	35	1500	24.70	Water

No. in Service.	Make.	Horse Power Rating.	Mileage per Month.	Cost per Mo. Fuel & Oil.	Service.
PENNSYLVANIA.					
Harrisburg—					
1	Cadillac	..	...	.....	Highway
1	Cadillac	..	...	.....	Water
Philadelphia—					
1	Oldsmobile	40	...	.....	Mayor
1	National	40	...	.....	School
Pittsburg—					
1	White	..	...	.....	Official
1	White (5-ton Truck)			.....	General
2	White	..	...	.....	Inspection
3	Auto	..	...	.....	Water
RHODE ISLAND.					
Pawtucket—					
1	Studebaker	30	266	6.20	School
1	Gramm	24	500	13.06	Water
1	Maxwell	20	700	13.60	Water
(The two latter are trucks.)					
TENNESSEE.					
Nashville—					
1	Haynes	40	1000	19.40	Official
1	Marathon	45	900	20.50	Official
1	Marathon	35	700	18.60	Official
(Three cars above used by Mayor, Board of Works & Supt. of Schools.)					
2	Studebaker	30	850	15.00	Lighting
TEXAS.					
Austin—					
1	Brush	12	...	.....	Water
1	Stoddard	30	...	.....	Lighting
Fort Worth—					
1	Premier	..	...	.....	Mayor
1	Buick	..	...	.....	Building
1	Buick	..	...	.....	Water
1	Ford	..	...	.....	Water
2	Jackson	..	...	.....	Lighting
WASHINGTON.					
Seattle—					
1	Chase	20	400	6.40	
(Truck used by Weight and Measure Department.)					
1	Studebaker	30	467	9.97	Water
1	Ford	20	772	8.47	Water
(The cars below mentioned for water service are trucks.)					
1	I. H. C.	22	450	9.64	Water
1	Chase	15	330	9.05	Water
1	Chase	20	588	10.42	Water
1	Chase	20	348	10.72	Water
1	Chase	20	543	8.26	Water
1	Chase	20	413	8.57	Water
1	Chase	20	389	7.96	Water
Tacoma—					
1	Ford	20	...	.....	Water
1	Excels'r (c)	3	...	.....	Water
1	Buick	23	...	.....	Lighting
1	Overland	20	...	.....	Lighting
WISCONSIN.					
Eau Claire—					
1	Buick	18	...	.....	Water

USERS' OPINIONS ON MOTOR EQUIPMENT.

PHOENIX, ARIZ.

The city of Phoenix has in use one automobile now, which is used by the superintendent of the water department. We recently instructed the purchasing agent of the city to buy an auto for the street superintendent. We have found the machine saved a great deal of time and consequently is a very paying investment.

LLOYD B. CHRISTY, Mayor.

SAN DIEGO, CAL.

The city owns twenty-three automobiles and twelve motorcycles used as noted in the tables. In addition to these, allowances for private machines used in city business of a total of $125 are made. For your further information we state that in practically every case the auto and motorcycle are giving satisfaction and doing a greater amount of work than was done by horses and the upkeep is reasonable, all the supplies being purchased at wholesale prices by purchasing bureau. The city owns no garage.

P. E. WOODS, Supt. of Finance.

SAN FRANCISCO.

With the completion of the five-million-dollar high-pressure water system, San Francisco today is one of the best fire protected cities in the country. But the present official administration, headed by Mayor James Rolph, Jr., will not be content until the horse-drawn vehicles are replaced by up-to-date motor-driven fire apparatus.

It was only recently that the modern motor-driven chemical engines were introduced into San Francisco's fire department. Owing to the many steep grades and hilly sections to be covered it was believed for a long time that the apparatus propelled by motor power could not be used here to advantage.

Mayor Rolph and the fire commissioners, nothing disheartened by croakers, decided to determine for themselves the possibilities of the motor-driven engine, and for the test they chose the steepest section in the city, the California street hill.

The start of the test piece of motor apparatus was made from the levee at California and Montgomery streets. The moderate grade between Montgomery and Kearny streets was traversed with the speed of an arrow. From Kearney street to Grant avenue the grade is much heavier and there was but slight decrease in the speed of the engine. Between Grant avenue and Stockton street the incline is so steep that it would be nigh impossible for heavy draft horses to haul a small delivery wagon up it—much less a ponderous steam engine. The motor chemical took this grade, but when half way up the hill it came to a dead stop.

The croakers shouted, but almost immediately the engine again started up the hill and flashed across the summit.

Deep was the disgust of the opposition when the announcement was made by the fire officials that the test called for the engine being brought to a stop when half-way up the grade and then started again without any loss of ground when the brakes were released.

That test sounded the death knell of horse-drawn fire apparatus in San Francisco.

An eight-horsepower hook and ladder truck with a guaranteed speed of 35 miles an hour on the level ground and 10 miles on the

grades was recently purchased by the fire commissioners, together with two chemical engines. The commissioners now have under consideration bids for furnishing a half dozen or more combination chemical and hose wagons. Within the next year several hundred thousand dollars will be spent for motor-propelled fire apparatus and if the program outlined by the administration is carried out, the entire department will be completely equipped with motor vehicles before the opening of the Panama-Pacific Exposition in 1915.

Motor apparatus is also being introduced into the police and health departments. One motor ambulance is in the hospital service and another will be ordered before the new year. The police department has one motor patrol wagon and proposals for three more are being prepared. No time will be lost in equipping all of the city departments with motor apparatus, now that it has been established to the satisfaction of the officials that the motor-driven engines, ambulances and patrol wagons can be successfully piloted over the steep grades and hilly sections of San Francisco readily.

JAMES P. SLEVIN,
Clerk Board of Supervisors.

PASADENA, CAL.

Very frequently I have been called upon to make a statement regarding the use of the city's automobiles. I shall take this opportunity to answer all these inquiries on the subject and the following table shows the cost of operating, repairing and equipment, city automobiles, for 1911-12:

Street Department—	
Superintendent's machine, 12 months	$424.24
Foreman's machine, 12 months	495.67
Assistant Superintendent's, one and one-half months	42.52
Engineer's Department—	
City engineer's machine, 12 months	425.01
Chief inspector's, 10 2/3 months (estimated)	382.45
Plumbing and Electric Inspector's Department—	
Inspector's machine (new six months), approximately	125.00
Inspector's machine (old six months) approximately	175.00
Building Inspector's Department—	
Inspector's machine (six months) approximately	175.00
Police Department—	
Police machine 12 months	582.26
Municipal Light Department—	
Manager's machine (new six months)	108.53
Manager's machine old six months	288.08
Health Department—	
Sanitary inspector's machine, 12 months	124.38
Veterinary's machine (five months rented)	125.00
Health officer's machine, 12 months, no charge	.00
Fire Department—	
Chief's machine, (12 months rented)	300.00
Auditor's Department—	
Auditor's machine (rented)	80.00
Efficiency Bureau—	
Bureau's machine (eight months, no charge)	.00
City Council—	
Councilmen's machines, no charge	.00
Total auto expense (exclusive of depreciation 1911-12)	$3853.14
Estimated depreciation on nine machines	2000.00
Total	$5853.14

Cost of operation, maintenance and depreciation on five motorcycles not included.

During the present fiscal year the municipal lighting department will run two auto trucks at a big saving over horse hire. The fire department has just added an old Hudson to its equipment for the assistant chief and a new machine must be purchased for the chief, and as soon as we take over the water companies, five additional machines will come into service, including two trucks.

When all of these machines are in the care of a central garage the efficiency bureau will keep account of the gasoline, oil, repairs, mileage, depreciation, etc., of every city automobile, provide the most economical method for purchasing supplies and insist on the cheapest operation and the most careful handling.

WILLIAM THUM, Mayor.

WASHINGTON, D. C.

Maj. Richard Sylvester, superintendent of police for the District of Columbia, is especially an enthusiast on the subject of motor equipment. While he has but one automobile patrol in service in his department at present, that one being a Franklin machine assigned to the second police district, Maj. Sylvester's department has made estimates for five additional motor vehicles to take the place of ten horse-drawn vehicles.

Maj. Sylvester states that he bases these conclusions on experience already had. Relative to the cost of operation of the one machine which he has in use, the following figures are furnished, comprising a detailed account of expense of operation for the fiscal year ended June 30, 1912:

Tires	$222.75
Inner tubes and repairs	7.25
Rubber patches	.80
Oil	21.13
Gasoline, 900 gal	76.50
Repairs	94.60
Miscellaneous supplies (waste, spark plugs, etc.)	52.28
Total cost	$474.87

Chief Wagner, of the fire department for the district, is a thoro convert to the motor fire truck and he has one now in service. In the event appropriations are available, Chief Wagner's department most probably will be equipped with two more trucks in the near future.

ROBINSON.

TAMPA, FLA.

In addition to the motor equipment mentioned in the tables, we contemplate buying this year for the sanitary department, a street sweeper, sprinkler, and a number of garbage trucks.

D. B. MCKAY, Mayor.

CHICAGO, ILL.

Besides the automobiles given under the various headings in the tabulated list, the city rents machines from private garages, for the use of all other departments. These machines are obtained on a requisition thru the city purchasing agent.

FRANCIS A. EASTMAN, City Statistician.

PEORIA, ILL.

The city has at present, only the two fire department machines, mentioned and described in the tables. The peculiar topography of the city makes them very useful for the work at hand, as the residence portion of the city is almost entirely situated upon a bluff rising above a river. The auto apparatus is enabled to take the heavy grades without the delays incident to dragging heavy horse-drawn equipment up the hills, and without the exhaustion to the men; for under the old system, it was necessary for the men on the apparatus to walk up the hills, and often

to help pull the heavy old-style equipment up by hand. Then too, the gasoline pumping engine is kept at a station on the bluff, and used in almost all fires, for the hydrant pressure is inadequate for fire service on the higher ground. It is probable that it will be found necessary to purchase a chief's car within the next year.

THOMAS M. WORM,
Chief of Fire Department.

ROCKFORD, ILL.

Long, hard runs for the horses compelled the adoption of auto equipment, and also did away with the need of stations in the outlying factory districts, for with motor apparatus, the runs can be made from the central station in the same time as would be needed by horses stationed in the outer fire houses. It is expected that the police department will soon adopt motor cars.

W. W. BENNETT, Mayor.

ELKHART, IND.

The purchase of the motor engine after the Conn fire of 1910 and a full investigation of all apparatus has been a pronounced success both from an economical and practical point of view. First, its greater efficiency by reason of rapid transit and increased radius of action is most favorably to be commended, also from the fact that it carries its own hose to the amount of 1,250 feet and its full complement of firemen to handle same. The cost of installation was about the same as a first-class steam fire engine and equipment, but the cost of maintenance is less, as it requires 2 men less and does away with three, if not four, horses.

The expense of operating our engine for the year 1911, for gasoline and oil, to attend 201 alarms, covering 636 miles, was $38.50; for tire replacement or repair, $30.00; miscellaneous supplies and equipment, about $20.00, making a total of less than $100.00. This is a very favorable comparison against the keep of three horses, and supplies that would have been required for a steam engine. Such has been our experience in the use of the automobile fire engine, that we can state that all sub-stations will be similarly equipped as rapidly as possible.

The same can be said of the police patrol, as all phases of the matter were gone into before ordering same.

The efficiency of the motor fire engine in heavy snow is most decidedly in favor of same. It goes out at a high rate of speed, where a team could only walk and flounder thru, at the best. We believe it has come to stay and will replace all horse-drawn apparatus in the near future.

E. L. BURNS, City Controller.

SAGINAW, MICH.

A belated report from George C. Warren, auditor of this city states that the city uses one combination auto fire engine and hose truck, and an auto police patrol.

WEBB CITY, MO.

A unique piece of apparatus is in use in this city. An Oakland 40-horsepower car is made use of for the purposes both of a police patrol and combination hose car. The hose is carried in a "fals" box suspended over the car, when it is not on duty, or when being used as a patrol in police service. In event of a fire, this box is dropped into the car and is ready for instant service. The box carries 500 feet of hose and two 3-gallon hand chemical tanks.

J. A. BALLARD, Fire Chief.

NEW BRUNSWICK, N. J.

A city service truck, carrying 340 feet of ladder, and all equipment has just been ordered, and within a short time a triple combination fire engine will be added.

HARRY J. FRANCIS,
Chief of Fire Department.

ASHEVILLE, N. C.

While our experience with auto-propelled apparatus has been short, it has been very satisfactory, considering both economy of operation and efficiency.

One year ago this month, a committee was appointed from the city council to look into the matter with the result that on the 27th of September, 1911, a contract was signed with the Seagrave Company, of Columbus, O., for two 80-horsepower combination hose and chemical trucks, carrying in addition to the regular equipment two 20-foot extension ladders, regular equipment consisting of 2,000 feet of 2½-inch hose, one 45-gallon chemical tank, with 150 feet of ¾-inch chemical hose, two 5-gallon hand extinguishers, axes, crowbars, etc. Since the fire trucks were bought, we have added a 30-horsepower Chase model patrol wagon, which also figures in the fire department equipment.

The decision in favor of them was based on two factors—first, economy of operation, and second, the decisive sixty seconds gained in reaching the fire.

Considering the first factor, we had three double teams, which were costing us about $1,500.00 per annum to maintain, and in addition the fact ever before us of the horse that is getting too old and having to be replaced at a sacrifice. In comparison with the above, the average expense per month of operating the three machines is about $20.00, this being for gasoline and lubricating oil.

As to the second factor, we have only one station and an area of 2½ miles square to cover, station house about the center. Our service is volunteer, with the exception of four paid drivers, but most of the firemen are employed near enough the station to catch the truck and in the event they do not, we follow up the fire truck with the patrol wagon, with officers and firemen who failed to catch the truck.

Perhaps we will not reach a fire near the station any quicker now than with the old apparatus, but on a long run, the motor will save from one to two minutes every time. On first alarm one truck responds, on second alarm the other truck responds, trailing a fully equipped hook and ladder wagon with 30-foot extension ladders, life net, etc. This is our old horse-drawn hook and ladder wagon, with the tongue cut to six feet in length. It works admirably and one would be surprised how short a turn can be made with this lengthy apparatus. Our equipment is beyond the experimental stage and we vote them a success. We are now asking for bids on a 4,000-pound truck for our sanitary department.

J. M. CLARK, City Auditor.

WILLIAMSPORT, PA.

The city has at present no automobiles in service, but there is an ordinance in the council at the present time providing for one for the fire department, and one for the police department.

SAMUEL STAHLER, Mayor.

YORK, PA.

We have no automobiles in our city service. Plans are about developed, however, for the fire chief to have a motor car and it is expected that the police patrol will be a motor vehicle within the next year.

JOHN R. LAFFAN, Mayor.

PAWTUCKET, R. I.

In addition to two machines now in service the city has just completed a new fire station to house nothing but motor-driven apparatus. It is the first city in the state of Rhode Island to construct such a house. There is under construction for this house a Garford combination hose and chemical wagon. It weighs 6,180 pounds with equipment, excluding men. It is built on a Garford chassis and the body was built by local people. The car recently on a trial carried sixteen men up High street, in addition to the regular equipment of the car. This new fire station will also house a ladder truck with tractor.

GILES W. EASTERBROOK, Mayor.

NASHVILLE, TENN.

The first purchase of an auto for the city of Nashville was an ambulance for the city's charity hospital in 1910. The city having increased its area from about nine to eighteen square miles, taking in several suburban districts which had become thickly settled, it was found that more horse-drawn ambulances would be required to take care of the emergency calls occasioned by the increased territory. To obviate this, it was decided to purchase an auto ambulance, which was an immediate success, and at once demonstrated its superiority over the horse-drawn vehicle.

The next purchase was a touring car for use of the field corps in the engineering department, where formerly surreys and teams were used. The adaptability of the auto for this service was at once apparent.

Then came the auto for the fire chief, built on up-to-date lines and equipped with chemical extinguishers, etc. It required but a few days to convince even the most skeptical of the vast possibilities of the auto in this branch of the service.

During the past year automobiles have been purchased for the mayor, board of public works, and the superintendent of the city schools. The benefits the city derives in having her officials equipped so that they can give constant and proper attention to the schools, public improvements and the various municipal departments, are incalculable.

The same conditions having arisen in the police department as with the city hospital, the horse-drawn patrol wagon was replaced with the auto, resulting in better service at less expense.

Quite recently an auto roadster has been provided for the assistant fire chief, and also one for the disinfector in the health department, whose duty it is to look after the fumigation of houses where contagious diseases have been confined. The superintendent of the municipal lighting plant has likewise been furnished with an auto run-a-bout, the better to attend to his duties, and the night trouble man in this department is also equipped with an auto, thereby enabling him to render much better service than with the old fashioned cart and horse. The installtaion of these machines, in every instance, has been a step toward better service.

The last acquisition of autos in our municipal service is the purchase of three motor triple combination fire engine, chemical and hose cars for the fire department, which are now being built especially for Nashville. On account of their speed and equipment they will mainly be used in the suburbs where the distance between fire stations is larger than in the uptown districts. This will make a total of seventeen automobiles in the city service.

J. W. DASHIELL,
Secretary Board of Public Works.

OGDEN, UTAH.

Ogden City has recently adopted the commission form of government. There are three commissioners. I am pleased to say that two of the three commissioners are owners of automobiles, which they are glad to use in the business of the city when its interests can in any way be furthered thereby.

A. G. FELL, Mayor.

ROANOKE, VA.

The three combination Seagrave, hose and chemical cars mentioned in the tables, are all stationed in the residence section, where long runs are necessary. They are housed in specially built brick stations, with slate roofs, constructed after the fashion of residences. The three houses cost, exclusive of lots, about $20,000.

JAMES MCFALL,
Chief of Fire Department.

SEATTLE, WASH.

The tables show the automobiles in service in the police, park, water, health, fire utilities and city engineering departments. The law department, legislative department, buildings department, city treasurer's department, city comptroller and ex-officio city clerk's department, harbor department and library department have no cars, altho it may be of interest to know that the harbor department has a 42-foot launch for patrol work of the department during the day and for police patrol at night. The launch is equipped with a 20-horsepower Frisco Standard engine and uses $27.50 worth of gasoline and $3.00 worth of oil in the service, which will approximate about five hundred miles per month.

As the ordinance regulating the use of automobiles by city employes may be of some interest to you, I am transmitting herewith copy of same.

Be it ordained by the City of Seattle as follows:

Section 1. That it shall be unlawful for any official or employe of the city of Seattle to use any automobile belonging to the city of Seattle unless such machine is properly lettered in accordance with the provisions of Ordinance No. 22187, and it shall also be unlawful for any official or employe of the city of Seattle, or other person, to use any automobile belonging to the city of Seattle at any time of the day or night, for any purpose other than the transaction of business for and on behalf of the city of Seattle.

Sec. 2. That any person found guilty of a violation of the provisions of Section 1 hereof shall be deemed guilty of a misdemeanor and shall be fined in any sum not exceeding one hundred (100) dollars or imprisoned in the city jail for a term not exceeding thirty (30) days, or may be both fined and imprisoned.

Ordinance 22187, as amended by Ordinance 25479·

Section 1. That the board of public works be and it is hereby authorized and directed to letter, in characters not less than four (4) inches in height, all automobiles belonging to the several departments of the city government of the city of Seattle, in such manner and in a conspicuous place on each machine as will properly designate such vehicles as the property of the city of Seattle and the department to which the same belongs, and that for such purpose the sum of two hundred and fifty ($250) dollars, or so much thereof as may be necessary, be and the same is hereby appropriated from the general fund; provided, however, that the provisions of this ordinance shall not apply to machines of the police department of the city of Seattle.

A. L. VALENTINE, Superintendent,
Department of Public Utilities.

THE QUESTION DEPARTMENT

Catch Basins to Prevent Escape of Odors from Sewers.

I would be pleased to receive information on sanitary catchbasins for use on streets and in public places, to eliminate bad odors from sewers. Possibly you can indicate different makes and how basins can be constructed with or without ventilation to abate such odors. MUNICIPAL, New York City.

The surest way to prevent the escape of odors from sewers is to remove the sewage so rapidly that there is no odor to escape. While this is impossible, very close approach to it is possible where there is good fall in the sewers and care is taken to prevent the entrance into the sewers of anything which will deposit in them and thus produce pools of sewage and cause decomposable matter to remain behind on the walls of the sewer when a flood time has passed and the water has subsided to the usual low water flow.

Catchbasins are primarily for that purpose, and they are not always trapped, because, under the best conditions, the traps are not particularly needed. They are usually trapped because the conditions are not ideal and too much odor is at times exhaled from the sewer. Much of the bad odor observed about catchbasins comes not from the sewer, but from decomposing street dirt and washings in the catchbasin itself.

Cleanliness is the only preventive of catchbasin odors which the writer knows, and cleanliness of the catchbasins is the large factor. If the basins are cleaned after rains, before the material on them has had an opportunity to decompose seriously, and the basin and trap are filled with comparatively clean water, much of the complaint of catchbasins will be eliminated.

Traps are not infallible, and if they depend on water they may be opened by its evaporation or leakage. Repair of basins and reduction of water area for evaporation to a minimum help here. But, again, cleanliness of the sewer is the surest way of keeping odors below the point of nuisance. Therefore, the sewers should be cleaned as frequently as the presence of odors demands. The frequency of the cleaning will depend upon the condition of the sewer as to design and care in construction, entrance of street dirt or other material producing deposits, and the like.

Cleanliness is expensive, and so is not usually insisted upon.

If there is any form of catchbasin or trap or sewer which does not demand cleanliness to prevent nuisance, the writer does not know it.

If factories of any sort discharge offensive matters into the sewers, a special condition is produced which demands special remedies. Public opinion is traveling toward the position that a single factory should not be permitted to place a burden upon the whole system of sewers and every one affected by them, which, when odors on the street from sewer openings or leaks is concerned, includes every inhabitant of the city. This position, when reached, will require each such factory to disinfect and deodorize its own trade waste before discharging it into the sewer.

Numerous designs for catchbasins of all sorts and conditions will be found in the volumes of MUNICIPAL ENGINEERING, but none of them can prevent sewer odors on the street at all times without the constant aid of the sewer and catchbasin cleaning gangs.

Siphoning Sewage Over Hill

Will you kindly advise us as to any sewerage systems where any form of the siphon was either successfully or unsuccessfully used to carry sewage over a hill?

W. C., ——, N. Y.

Can our readers cite any cases of this sort? None which are actually siphons are known to the writer, though he knows of several so-called inverted siphons.

Siphons for carrying water over rises of ground 20 or 25 feet above the water level from which water is to be taken were described in MUNICIPAL ENGINEERING several years ago, with some of the difficulties overcome in making them practically successful. These might be used in carrying sewage over similar hills, but there would be several additional difficulties, such as the accumulation of floating matter at the summit of the siphon, and accumulation of gases as well as air

at the same point, with consequent necessity for special provision for withdrawing the gases continuously or at frequent intervals and for drawing off the floating matters whenever they become troublesome. It is quite probable that all this would cost more than the excavation of the comparatively few feet necessary to put the sewer through on a down grade all the way.

Economy and Efficiency of Electrical Treatment of Sewage

What is the present prospect of efficiency and economy in electrical treatment of sewage? What manufacturers or engineers are offering it as a business in practical form?
C. E. V., ——, Ohio.

The efficiency of the electrical treatment of sewage is high, theoretically, for the chemicals producing the desired effect are used at the time of most activity. Practically it depends upon the design and operation of the electrical apparatus. That in use at Santa Monica, Cal., and in Oklahoma City, Okla., is reported to be quite as efficient as any other process. Claims of economy are also made, but there is not yet a sufficient amount of evidence to make them certain. The plants used thus far are small, what would be termed experimental plants in the study of the treatment of the large amounts of sewage produced by large cities, so that neither efficiency nor economy is yet certain for them. All that can be said at present is that the process gives promise of future development toward greater efficiency and economy.

C. B. Irvine, Santa Monica, Cal., and A. J. McMahan, Oklahoma City, Okla., can give information as to the practical installation of plants.

Form of Ordinance for Assessing Cost of Sewers

I would like to have references to articles in MUNICIPAL ENGINEERING containing model form of ordinance for assessing cost of sewers.
B., City Attorney, ——, Ala.

The exact form of such an ordinance must be governed by the statutes of the state. A form of ordinance used in Georgia is given in vol. xlii, p. 113, which may serve also in principle, if not exactly in form, for Alabama cities.

Specifications for Concrete Street Pavement

Please tell me where to get a copy of specifications for concrete streets. We are thinking of paving one of our streets with concrete (without brick).
C., Councilman, ——, Mo.

Specifications for concrete street paving, as adopted by the Society for Standardizing Paving Specifications, will be found in the annual report of that organization, which can be obtained from the secretary, J. B. Hittell, City Hall, Chicago, Ill., for $5. The report also refers to the patented concrete pavements, which should be laid according to the specifications of the patentees. Names of some of these will be found in the "Business Directory" printed in each number of MUNICIPAL ENGINEERING, under the headings, "Armored Concrete Pavements," "Granocrete Pavement," and constructors of such pavements will be found in the list of "Paving Contractors."

Specifications for concrete pavements will also be found in the "Handbook for Cement Users" ($3).

Specifications for the concrete paving in Mason City, Ia., will be found in MUNICIPAL ENGINEERING, vol. xl, p. 174. Earlier numbers contain specifications used in other cities.

Cement Sidewalk Specifications

I am anxious to secure the most approved specifications for the construction of concrete sidewalks. Our city has used two or three different specifications for this work, and I am frank to say that the work done under them has not been very satisfactory. I don't know whether the specifications were at fault or the contractor. I would be very greatly obliged to you if you could furnish me with any information along this line.
F. C., City Attorney, ——, Ky.

Standard specifications for cement sidewalks, as adopted by the Society for Standardizing Paving Specifications, are printed in the annual reports of that association, obtainable of J. B. Hittell, secretary, City Hall, Chicago, Ill., for $5.

It is quite possible that the contractor is at fault. If the specifications are good and are not followed carefully, the results may not be good. Contractors not under efficient and honest inspection can reduce the amount of work and the amount of materials, especially of cement, and still not show the defects on the surface of the completed work, but they develop later, usually after his responsibility therefor has ended. The foundation and base of the walk need inspection while the work is going on; the top can be inspected at any time, and the inspection of base is more important than that of top.

Information about ordinance for concrete sidewalk construction is given in MUNICIPAL ENGINEERING, vol. xlii, p. 116, and xxxvi, p. 30.

How to Design a Reinforced Concrete Smoke Stack

I have just designed a reinforced concrete smoke stack for the city pumping station here, and if your question department has at

hand any formula for figuring the reinforcing steel for a stack of this kind, I would like a copy of it so that I can check my own figures for it.

T., City Engineer, ——, Mich.

Buel and Hill's "Reinforced Concrete" ($5) gives the steps of the process used to compute the overturning moment of wind at the base and the moment of resistance of the steel reinforcement about the center of figure of the base. Then the maximum stress per square inch of steel on the windward side will be equal to the overturning moment divided by the moment of resistance of the steel. Examples are worked out in detail to show how to apply the process.

McCullough's "Reinforced Concrete" ($1) gives a similar process, somewhat more complicated in statement.

Taylor and Thompson's "Concrete, Plain and Reinforced" ($5), has the most complete discussion of the problem, covering nine pages and having tables of constants for use in formulas, which should be followed closely if their method of computation is adopted.

Book on Reinforced Concrete Reservoirs

I want to build a million-gallon reservoir, reinforced concrete, and would like to get the best book that can be bought on this class of work. If you have such book, please give me name and price on same.

G. City Engineer, ——, Ga.

Gillette and Hill's "Concrete Construction" ($5) gives descriptions of reinforced concrete reservoirs, both smaller and larger than the size mentioned, covered and uncovered. Heidenreich's "Engineers' Pocket Book of Reinforced Concrete" ($3), Reid's "Concrete and Reinforced Concrete Construction" ($5), give some space to the subject. None of these books treat reservoirs in more than incidental manner, and the writer knows of none that is more complete.

Ordinance Ordering Paving in Illinois Village

I have a paving ordinance to draft and will be glad to have one favorable to Illinois villages.

B., Village Attorney.

The procedure in Illinois is rather complicated, and the National Paving Brick Manufacturers' Association has prepared a book giving all the forms required. This can probably be obtained on application made to Will P. Blair, secretary, Locomotive Engineers' Building, Cleveland, Ohio.

Codifications of City Ordinances

I am engaged in the revision and compilation of the city ordinances of our city, and thought perhaps you had a model set of ordinances for a city that would give me a great many ideas as to the arrangement and form of the ordinances, and, if so, I would be pleased to receive such as you think would help me out. Also, would be pleased to receive such information as you have that relates to licensing and regulations for automobiles in the city, and also such data and information that you have in reference to the levying and collection of a license tax upon occupations.

C. A., City Attorney, ——, Kans.

Among the smaller cities of the Mississippi valley having printed codifications of city ordinances are Dubuque, Ia., Hammond, Ind., Lincoln, Neb., Sioux Falls, S. D. The city attorneys of these cities would doubtless supply the city attorney of a sister city with copies for his use. Kansas City, Mo., and Indianapolis, Ind., have specially complete volumes. All the special ordinances desired will be found in them. A form of automobile ordinance is given on p. 38 of the July number of MUNICIPAL ENGINEERING. A form of ordinance providing for collection of license taxes is given on p. 178 of the September number, with selections from its provisions. This is from Harrisburg, Pa., and is one of the most complete compilations of license taxes in use in the smaller cities.

Ordinances Requiring Weed Cutting and Refuse Removal

The Colorado legislature recently passed a law permitting cities to require property owners to remove weeds, brush and rubbish from lots and alleys behind, and sidewalk area in front, and, upon his failure to do so, the city might have same done and cost assessed against the property. Any information on this subject would be desirable, as to constitutionality of act, etc.

S., City Attorney, ——, Colo.

Such ordinances are very common and will undoubtedly come under the police powers of the city if there are no special legislative acts governing their form or content. They would also come under the police powers of the state, and so would be constitutional unless some special provision in the constitution might rule them out. The first Indianapolis ordinance on the subject was passed in 1889, and made the maintenance of weeds a misdemeanor, punishable by $25 fine. After the charter of 1891 was granted, a new ordinance was passed giving the department of health power to cut weeds and assess the cost on the property in case the property owner failed to attend to it on official notice.

Ordinances providing for inspection of nuisances on property and fine on failure to remove upon notice have been in existence since 1871. Ordinance requiring dirt or mud to be removed from sidewalk by owner or occupant of the abutting property was passed in 1896, and one requiring occupants or owners of unoccupied property to clean off snow and ice

was passed in 1899. Ordinance giving board of health power to inspect lots, alleys and streets, and enforce cleaning of same by occupants of adjoining lots or by owners of unoccupied lots, was passed in 1872.

It will be noted that all the ordinances passed before the new charter of 1891 provide for fine in case of failure to clean up as required, and this was probably all that could be done under the existing statutes. The new charter gave the city power to do the work on failure of the individual and to assess the cost on the property. The constitutionality of both procedures would doubtless have been tested within the twenty-two years, if not before, if there had been any question of the same.

Installation of Hypochlorite Plant

I am anxious to get some information regarding the installation of hypochlorite water purification outfits. In our case it will be necessary to install a pump or injector so as to force the water into our intake, as we have no intake well. T., ——, Mich.

Will our readers send us statements of their experience and descriptions of the machinery and methods used for the benefit of our correspondent and others?

Some information can be obtained from an article on "Sterilization of Water," in MUNICIPAL ENGINEERING, vol. xxxviii, p. 313; in articles on the sterilization of the Boonton reservoir of the Jersey City water supply, in vol. xxxvii, pp. 6, 86 and 158; and in the article on the purification of the McKeesport, Pa., water supply, in vol. xxxviii, p. 383.

Franchise for Electric Light and Water Company.

We want to obtain franchise from our city council for combined electric light and water plant. Can you furnish us with copy of franchise that will meet our requirements?
G., ——, Tenn.

No franchise for combined electric light and water plant happens to be at hand. Perhaps the Loveland Citizens' Electric Company, of Loveland, O., whose plant is described in MUNICIPAL ENGINEERING, vol. xli, p. 198, would be willing to send a copy of their franchise. Many forms and skeletons of franchises for various public service utilities have been published in MUNICIPAL ENGINEERING, a list of the more recent of which will be found in this department, under the heading "Forms of Franchise Ordinances for Public Utilities."

If any of our readers will send a copy of such a franchise as our correspondent wishes, we will forward it to him and give its provisions in this department for the benefit of all who may be interested.

Qualities of Concrete Pavement

This city has a paving proposition up at present. We have very poor laws in Arkansas in regard to bonding for public improvements, and I don't think we will be able to raise the money for brick or creosoted blocks, but think we can for concrete, and I would like very much to get any information you can give me as to whether this pavement is durable, how it should be mixed and laid, and proper expansion. We will probably have to use a gravel we have near here, which is a very good gravel and has in it quite a lot of very good sand. G. A., ——, Ark.

There are great differences of opinion regarding the durability of concrete pavements, due, no doubt, to the differences in design of pavements, materials and methods of construction. Like all concrete construction, a concrete pavement is very poor if it is poorly constructed. Likewise concrete has been put on some streets without proper attention to design of details in accordance with the special requirements of the case and has, therefore, failed. There are many reports of good success with concrete streets, some of them giving enough detail to show the conditions under which success is attained.

Good specifications for a concrete street will be found in the proceedings of the Society for Standardizing Specifications for 1912, copy of which can be obtained of John B. Hittell, secretary, City Hall, Chicago, Ill., for $5.

Some recent articles in Municipal Engineering will give information as to cost, methods of construction, suitability, etc.: "Cost of Concrete Roads," vol. xliii, p. 44.

Vol. xlii: "The Blome Concrete Pavement," p. 340. "The Dolarway Bituminous Surface Concrete Pavement, p. 136. "Bitucrete Pavement," p. 233.

Vol. xli: "Mixing Concrete for Street Paving," p. 50. "Concrete Pavement with Bituminous Wearing Surface," p. 376. "Bituminous Wearing Surface for Concrete Pavements," p. 215. "Paving in Mason City, Iowa," p. 461.

Vol. xl: "Cement Concrete Paving in Mason City, Iowa," p. 174.

Vol. xxxix: "Fond du Lac's Cement Streets," p. 136. "Street Paving in New Orleans," p. 260, mentions granitoid as a popular form of paving. "Cement Streets of Fond du Lac, Wis.," p. 284. "Concrete Pavement in Delphi, Ind.," p. 294.

Vol. xxxviii: "Specifications for Concrete Sidewalks, Curbs and Gutters, and Pavements," p. 244.

Vol. xxxvii: "German Artificial Stone Paving," p. 121.

FROM WORKERS IN THE FIELD

How to Waterproof a Pump Pit.

Editor of MUNICIPAL ENGINEERING:

Sir—In the September number of MUNICIPAL ENGINEERING, I noted that one of your readers was seeking information in regard to waterproofing a pit 22 feet square by 17 feet deep with a 15-foot head of water at the bottom.

There is no waterproofing compound on the market that will adhere to a surface through which water is leaking. There are several which are entirely satisfactory as waterproofing agents if the water is stopped long enough to allow the waterproofing substance to set up or harden. Usually to stop the water temporarily is a very expensive proceeding.

In the *Engineering Record* of March 9th, this year, was published an article describing a method of stopping leaks while the water is running through the surface.

In applying the method to your reader's case I would proceed as follows: Take two pieces of 2x12-inch rough plank 12 feet long. Place them edge to edge with a 2-inch strip of burlap between the full length of the joint—12 feet. Clamp the two planks together tightly with ship clamps and nail on 4-inchx4-inchx12-foot battens, two feet apart the full length of the planks, using 20-penny nails. On the side of the planks opposite to the one with the battens, ½ inch from the edge all the way around nail on ½-inch-diameter rope made of burlap tightly twisted by hand. Use 4-penny nails for this, spaced 2 inches apart.

As your reader stated that it was the bottom two feet of his pit that leaked, it is this portion that we will treat. With pick, hammer or wire brush take off the surface of the portion mentioned to a depth of 1/16 inch. Then throw on water and scrub off every loose particle with a broom. Our planks, already prepared, have been made into a form or packing which is to hold in place a coating of mortar. This mortar has been treated by the Sylvester process to make it waterproof. Take 1/3 pound lye to 1 pound powdered alum, well dissolved in water, which is added to the water used to temper the mortar, using one sack of cement and double that amount of sand.

Cover the face of the plank from inside the burlap rope with ½ inch of prepared mortar, trowelling it to an even surface. Turn the form over with the mortar to the leaking wall and by means of stout braces from the center of each batten to the opposite wall hammered into place with a sledge, force the form against the wall, allowing it to remain there three or four days. The wall should have an even surface where the burlap rope comes in contact with it, as this rope is really a gasket, to keep the mortar from oozing out, so must be tight against the wall at all points. Should there be cavities in the wall these should be filled with stiff mortar before the plank form is applied. If the water prevents this put enough mortar on the plank form in a cone shaped mass to fill the cavity, being careful to locate it correctly on the plank. If one to two per cent of bicarbonate of soda is added to the mortar immediately before it is placed on the plank it will cause the mortar to set up quickly, so that the form may be removed in twenty-four hours and placed again.

EDWARD O. KEATON,
Civil Engineer and Contractor,
Cincinnati, O.

How to Find a Lost Sewer.

Editor of MUNICIPAL ENGINEERING:

Sir—In the August number of MUNICIPAL ENGINEERING, I notice that E. W. R. asks how to locate a lost sewer. Let me suggest that he use a wireless pipe locator. First, send thru the sewer a light float, to which is attached a light string, long enough to reach any man hole that he has located. When float reaches man hole, tie string to a light wire and pull thru, bring wire up and complete circuit and connect the machine. If there is not sufficient water to pass the float use rods to pass the wire thru.

J. E. H., Oak Park, Ill.

An Individual Garbage Destructor.

Editor of MUNICIPAL ENGINEERING:

Sir—An individual garbage destructor built and used by the writer for the past three years has given such uniformly satisfactory results that its application to the requirements of small towns seems a simple matter. The plant has been very efficient on every class of garbage.

The general construction of the burner is shown in Figure No. 1, from which it will be noted it consists simply of a cement body containing two grates, one above the other, and a chimney made of an ordinary piece of tile. The frame or body of the burner, it will be seen, has but three sides, the fourth being left entirely open without even a door. In the first burner constructed, a door was provided, but it was found that better results were obtained by leaving off the door.

A fire is started on the lower grate, a wood fire being of ample life, and the garbage is then placed upon the upper grate. If a good fire is obtained before putting in the garbage, the incineration of the matter takes place rapidly and without any objectionable or unpleasant odors.

The mold for the concrete frame can be made very cheaply from wood secured by tearing apart old boxes. In order to make it easy to remove the boards making up the mold, after the cement has set, the following construction is suggested:

The back inner wall of the mold should be made as shown in Figure No. 2, the strips holding the individual boards together being screwed to the separate boards, not nailed. The two inner sides are similar. The strip A is to be screwed on, while the other strips may be nailed on. Be sure to make one side right hand and the other left hand.

The top of the inner part of the mold No. 2 are assembled and fastened together by nailing the side boards to the strips A on the back. Be sure to nail into this strip and not into the boards of the back as otherwise there will be trouble in removing the boards. Likewise the top boards are nailed to the strips A. It is not necessary to make a hole in the top for the chimney.

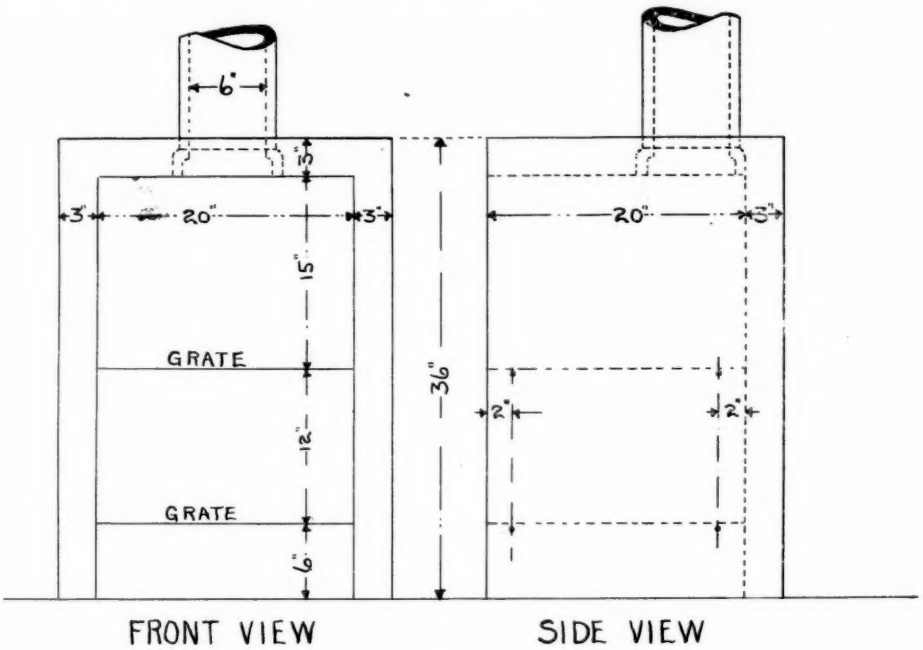


Fig. 1.
AN INDIVIDUAL GARBAGE DESTRUCTOR.

For the outside of the mold two sides will be needed. The back will consist of boards long enough to permit their being nailed to the strips A when the two strips are nailed 26 inches apart, measured from inside to inside. No top is needed.

The outside is assembled around the inner wall of the mold as shown in Figure No. 3, the strips X and Y being nailed on in front, not only to hold the front ends of the outer frame, but to act as a front retaining wall for the cement.

The mold as constructed should be placed on the spot selected for the burner and the inner wall squared with the outer one. Dirt should be thrown up against the bottom on both inside and outside of the mold to keep the cement from running out at the bottom.

After everything is ready holes about ½ inch in diameter should be drilled thru both inner and outer walls on both sides as indicated in Figure No. 1 and round sticks inserted. These are to provide holes in the concrete thru which pass the supports for the grates. The tile chimney, which should be about 6 inches in diameter, is placed upon the inner wall and everything is ready for the pouring of the concrete. A good concrete for this purpose is made of three parts good, sharp, clean sand and one part of a good grade of portland cement thoroly mixed together and moistened to have the consistency of mud. All it is necessary to do is to fill up the space between the two walls of the mold with this concrete, bringing the concrete up to the top of the mold, which will give a thickness of 3 inches for the top of the burner. The top can be reinforced by pushing into the concrete forming the roof of the burner a few flat iron bars of the size used for making the grates, tho this is not necessary.

After allowing several days to elapse for the concrete to harden, the mold can be removed. The outer wall can be readily taken off by knocking it apart. It will probably be best to first knock out the

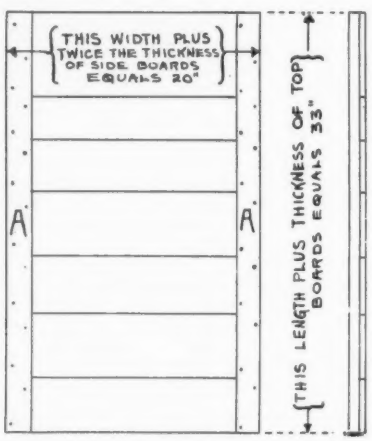


Fig. 2.
AN INDIVIDUAL GARBAGE DESTRUCTOR.

round sticks referred to. These will drive out very readily. The inner wall will come out easily if the screws used in holding part of it together are removed. When the top section is taken off it will be found that the hole for the chimney has been provided by the tile which was set upon this top section, and the concrete in the roof will hold the tile in place.

Thru the holes left by the wooden plugs

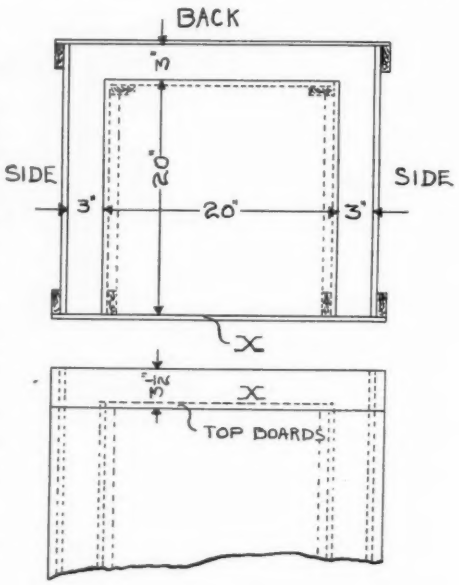


Fig. 3.
AN INDIVIDUAL GARBAGE DESTRUCTOR.

⅜-inch round rods are passed to support the grates. If these rods are threaded and provided with nuts on both ends it will be better, as then they cannot slip out of place.

The grates are made of ⅞x⅛-inch flat iron. The pieces forming the grate proper, are riveted to the cross pieces. These grates are placed upon the ⅜-inch supporting rods and the burner is completed.

Cost of Construction

A liberal estimate of the cost of this outfit, figuring that the mold will be made of old boxes so the wood will cost nothing, and based upon one doing the work himself will be as follows:

1 sack portland cement	$0.75
1 tile for chimney	.35
4 pcs. ⅜x27-inch round iron	.20
Threading 4 ends and 4 nuts	.40
4 pieces ⅞x⅛x19½-inch flat iron and 26 pieces ⅞x⅛x19-inch flat iron	.75
52 rivets and Drilling holes for 52 rivets	1.00
Total	$3.45

KARL W. KNORR, C. E.,
Mishawaka, Ind.

Chevy Chase Experimental Road, Washington, D. C.

CONDITION DURING FIRST SUMMER AFTER CONSTRUCTION BY PENETRATION METHOD.

The experimental road running from the boundary line of the District of Columbia to the Country Club, and the roads running from it, were built of different materials and treated in various ways to test both materials and methods of building first-class country roads, using mainly bituminous materials applied by the penetration method.

A correspondent who visited the road on July 14 sends the following report of the condition of the various sections on that date:

Lane adjoining north end and Chevy Chase Club.—This lane got so soft that they had to give it an additional coating of sand within two weeks after the road was finished.

District line, section 1.—The surface of this section is very soft in places, and today the tar coating was so soft that it was running and would stick to your shoes. It does not present a uniform surface, as in spots there does not appear to be any tar surface and the coarse stone shows on the surface.

District line, section 2.—An excess of tar on the surface, and it is softer, considerable of the excess of tar having run into the gutter. District line, section 2, can scarcely be distinguished from the adjoining pavements, but the tar surface was extremely soft to-day, with the tar in some places running toward the gutter.

District line, section 3.—The surface on this section in some places toward the city end shows what appeared to me like evidence of repairs. This section is not uniform in appearance, the top in some places showing an excess of tar, which is very soft, and in other places a deficiency, with the stone showing thru the surface, these spots appearing to be dry.

District line, section 4.—This section was very soft and sticky, the horses' hoofs cutting into it readily in many places. It seemed to me that there was an excess of tar used in the surface. The road was rather wavy and uneven, and there was evidence of repairs at the north end of this section. It was also beginning to ravel slightly at this end.

District line, section 5.—This piece of roadway was constructed on both east and west side of car tracks. It seems to be quite wavy, but does not show softness. It has apparently been repaired in several places, and in some places is now showing signs of raveling. I also noticed in one or two spots that this piece was showing signs of rutting.

District line, section 6.—This piece of roadway was also constructed on both east and west side of car tracks. The pavement appears to be very wavy in places and seems to be quite dry in spots, and in other places bleeding slightly. The general appearance, however, is fairly good. There were one or two places which to me showed evidence of repairs.

District line, section 7.—This is a very small section, but looks much better than section 8. It has more the appearance of an asphalt top, but seems to me to be quite dry and hard. There are several places, however, in this piece, that are beginning to ravel out in the surface.

District line, section 9.—This piece of road appears to be very dry and dusty to some extent, and is very uneven on the surface, and in some places raveling quite badly. There are also a number of places in this piece of road showing evidence that they will soon begin to ravel. I think this section of roadway will require considerable repairs very shortly. It had the appearance to me of a fairly well-built macadam road.

Motor Trucks Relieve Street Congestion.

BY CAPTAIN CHARLES C, HEALY, OF THE CHICAGO MOUNTED POLICE.

Take the horses off the streets. Replace them with motor driven vehicles. Then you will have gone a long way toward solving the problem of constantly increasing traffic congestion in our large cities.

I made this answer the other day when a man asked me, with much concern, if there was any immediate practical remedy for the crowded conditions that prevail in the Chicago loop district.

Our big State street stores were the first to realize the possibilities of the rapid delivery and relief of traffic congestion by installing motor trucks. They all have their delivery stations in remote parts of the city and convey packages to these depots, whence they are transferred either in small motor cars or in horse-drawn vehicles to the residences of purchasers. One of the largest State street stores has seventy-seven motor trucks, forty-four being of the heaviest gasoline type, 30-horsepower and carrying up to three tons, and thirty-three electric vehicles, which are employed in lighter delivery.

Furthermore, the motor truck, being more easily managed, will get away twice as quickly as the horse truck. There is no geeing and hawing and backing and sidestepping. You turn on your power and away you go, regulating your speed to meet conditions. I went into a good many of these details when I was called into conference with the Chicago Plan Commission, in connection with the so-called "link" or driveway connecting Michigan boulevard with the North Side.

MUNICIPAL MATTERS IN COURT

East Orange Damages for Diverting Underground Water

The city of East Orange, N. J., obtains its water supply from artesian wells at White Oak Ridge in Milburn. The state has had a series of seven years of deficient rainfall, amounting in all to about twenty-five inches, and ending only with 1911. Nevertheless, the pumping from the city's artesian wells is blamed for dry brooks and dry wells. The engineer of water works, A. A. Reimer, states his opinion that a succession of dry years reduces the ground water level and that subsequent wet years do not produce equal accumulations. A number of suits have been filed asking for considerable damages from the city for withdrawal of ground water from property in the vicinity of its wells. One of these brought for $20,000 damages by William E. Crosby, was decided by the Supreme Court, which gave Mr. Crosby $500.58 damages.

The city has procured much evidence as to the geology and water tables in the vicinity of its wells for use in this and other suits, and is so fully convinced of the justice of its cause that it has appealed to the Court of Errors and Appeals, where the case is now pending.

Two suits for damages were settled in connection with purchases of land in extension of the city's holdings under its plans for extension of its water supply filed with the State Water Commission. Threatened suits by a group of small property owners were settled by laying a small main along the road to supply them, thus securing a cession of all underground rights to the city.

One suit for $20,000 damages has not yet come to trial.

Ordinances Controlling Automobiles in Oklahoma City.

The commissioners of Oklahoma City, Okla., have passed a new automobile ordinance requiring all chauffeurs to be examined before they shall be permitted to receive a license. A feature of the ordinance is a section which provides that any operator of a motor vehicle who is connected with an accident on the streets shall at once report such accident to the police department. All license fees received by the city for automobiles are to be placed in a fund for the express purpose of maintaining Grand boulevard, the 28-mile driveway around the city. It is expected that this fund will amount to $12,000 per annum, thereby assuring the proper condition of the finest boulevard in the southwest.

Decisions of the Higher Courts of Interest to Municipalities.

Liability for Cost of Changing Grade of Water Pipes—Not Indebtedness—In May, 1905, defendant city passed an ordinance granting to plaintiff a new franchise for the period of twenty years, to take effect at the expiration of the old franchise, and which ordinance expressly provided that, in case of a change of grade of any street, the city should reimburse plaintiff for the expenses incurred by it in changing and relaying its mains and pipes necessitated by a change of such grade, and pursuant to such ordinance an express contract was entered into between said parties embracing, among other things, an express stipulation to the like effect. Held, That such ordinance and contract are valid and enforceable, and the city did not exceed its powers in obligating itself to reimburse plaintiff for such expenses; that such ordinance in this respect is not retroactive but prospective in its operation, although it applies to mains and pipes which were laid during the life of the old franchise; that under the provisions of such ordinance and contract the city is liable to the plaintiff for such expenses, whether the change of grade is from a grade already established by ordinance, or merely from a natural grade; that the obligations thus assumed by the city do not create an indebtedness in excess of the constitutional debt limit. Such stipulation created no indebtedness, but merely a contingent future liability. Bismarck Water Supply Co. v. Bismarck, (N. D.) 137 N. W. 34.

City Can Fix Rates Under Existing Contract, Notwithstanding Establishment of Pub-

lic Service Commission—Act of 1912, creating a public service commission, authorized to fix charges for gas and electricity, did not abrogate a right to fix charges, which was expressly reserved by the city of Charleston in the franchise granted to a public service corporation, where the commission had not undertaken to fix such rates. Charleston Consol. Ry. Ltg. Co. v. Charleston, (S. C.) 75 S. E. 390.

Right to Fix Rates May Be Reserved in Franchise Granted by City—While the state's power to fix charges of a public service corporation is not confered upon cities, and a city cannot fix such charges, unless the right to do so is expressly reserved in the franchise under which the public service corporation operates; yet, where this right is so reserved, the city may fix such charges. Idem.

Street Intersections Assessed on Property Benefited in Iowa—Code provides that the cost of paving a street may be assessed to the abutting property; that the cost, so assessed, shall not exceed the special benefits conferred by the improvement; and that the cost of street improvements at intersections may be assessed against the property abutting or fronting on that portion of the street so improved in proportion to the linear feet fronting or abutting on such improvement. Held, That the word "improvement," as so used, includes the entire work under construction on a particular street, and is not limited to the work done directly in front of the particular parce. of ground, so that the cost of paving street intersections was properly treated as a part of the whole improvement and taxed to the entire property abutting on the part of the street improved. Perry v. Albia, (Iowa) 136 N. W. 682.

Vote on Bond Issue for Both Light and Water System Is Not Invalidated by Constructing Only One—An ordinance, providing for the submission to the voters of the question whether the city should issue bonds to the amount of $23,000, for the purposes of installing and maintaining an electric light and water system, or either of these systems, submitted but a single proposition, the issuance of the bonds, and is not invalid in giving the council discretion to construct either both or one of the systems. Swann et al. v. City of Murray et al., (Ky.) 142 S. W. R. 244.

Drainage System Can Be Included in Street Paving Contract—The court will take judicial notice that a street improvement is permanent in nature, and that a system of drainage connected with such improvement is necessary and proper, and hence germane to the subject of an ordinance ordering such improvement. Gerlach v. Spokane, (Wash.) 124 Pac. 121.

Minimum Wage Excess Cost Not Assessable on Property—A property owner has a right to have free and open competition in the matter of improvements to be paid for by special assessments, unrestricted by any arbitrary rule or requirement which would have a tendency to increase the cost of the work, so that where a contract for street improvements was let under a city ordinance, fixing the minimum wage for work on the improvement at a rate at least 75 cents higher for an eight-hour day than was paid in private employment for a nine-hour day, a property owner may have a reduction of the assessment against his property in equitable proportion to the excess sum paid as wages. Idem.

Bonds for Municipal Water Works Issued Prior to Expiration of Franchise—A city, preparing for the construction of a water works plant four years before the expiration of the franchise of the existing water works company, and providing for the issuance of bonds for the acquisition of such a plant, does not abuse its discretion, and the court will not restrain the issuance of the bonds. Griffith v. Vicksburg, (Miss.) 58 So. 782.

Street Drainage Over Private Property—Where a city in constructing streets and alleys increased the flow of water to the sewer pipe of an individual, and the surface water from many acres of land was carried to the pipe, while such water had a natural drainage in another direction, and the pipe at the time of its construction was sufficient to drain the land naturally drained by it, the city must at its own expense provide a way for the escape of the water diverted by its improvements, and it could not compel the individual to provide at his expense drainage for such water. Stanford (Ky.) v. Aldridge, 147 S. W. 750.

Water Company's Services Offset for Taxes—Limit of Indebtedness—An agreement between a city and a water company that the company will furnish and supply all water for public buildings, etc., for such amount annually as shall equal the amount assessed by the city in taxes upon the water works system and franchises, in the absence of anything to show the want of good faith, that the contract is inequitable or imposes an unjust burden on the other taxpayers, or that the services performed by the company are disproportionate to the amount of taxes, will not be regarded as an exemption from taxation, but as a provision for the payment of the taxes by rendering services equivalent thereto, and hence is valid, especially where it has been carried out by the parties for a number of years. If the contract constitutes the creation of an indebtedness within the meaning of a provision of the charter limiting the amount of the indebtedness which the city may incur, it will not be held invalid on that ground, unless the city alleges and proves that by such contract an indebtedness exceeding the specified limit was imposed on the city. Winchester (Ky.) v. Winchester Water Works Co., 148 S. N. 1.

CIVIC BEAUTY

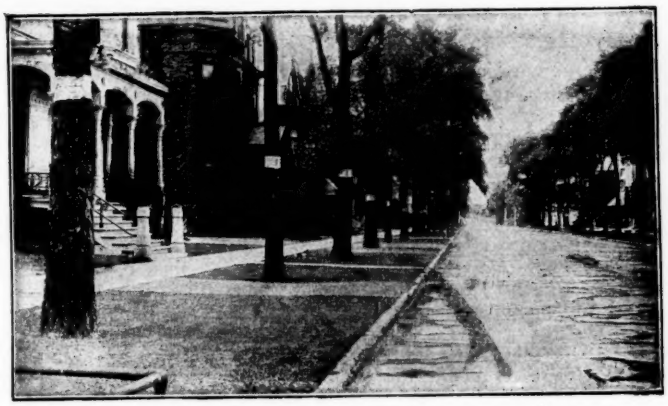
Tree Surgery

Tree surgery is a profession which has grown to considerable importance. In this way sick and diseased trees are being restored to health. Briefly, tree surgery consists in cutting out the rotted parts and filling the cavities thus made with some substance which will make the cavity water and air tight. Most of these cavities on city trees are the result of improper trimming. A stub is left where a branch has been amputated. This stub, into which the living sap no longer flows, becomes saturated with moisture, rot spores become active—the stub soon rots off leaving the beginning of a pocket or cavity which is gradually increased by the action of the rot spores and boring insects. Then the birds and squirrels begin to build their nests in these cavities and help to increase them until almost the entire center of the tree trunk has been destroyed. Unless this rotting is stopped the strongest and most magnificent tree will be destroyed.

The proper way to proceed is to clean out the entire cavity, using a chisel or gouge to remove all the rotten wood. Then wash the interior of the cavity with a solution of copper sulphate made by dissolving in a wooden vessel, one-fourth of a pound of copper sulphate in ten gallons of water. The solution can be sprayed into the cavity by means of a smal hand pump. This solution will kill all the remaining rot spore and the cavity is now ready to be filled with cement. The filling is made by using three parts of clean, sharp sand to one part of cement. Fill the cavity with this mortar and then bring the filling to a smooth water-tight finish, with a mortar made by using one part of sand to one part of cement.

TREE SURGERY.
Result of Poor Tree Work.

When the cavity is large, iron rods are sometimes used to reinforce the cement. Where defects of this sort are remedied before they have spread to any considerable extent the cure is simple and certain, and gradually the annual growth of the tree will cover the filling and conceal the patch of cement beneath the new bark; but while many trees can be saved in this way, there are an equal number beyond redemption, and the best thing to do is to remove them and plant healthy young trees to take their place.



TREE SURGERY.
Useless Tree Banding.

Chicago's Street Improvements

Improvement of the streets of the business section of Chicago thru co-operation with public authorities is the function of the committee on downtown streets of the Chicago Association of Commerce.

This movement aims at the realization of greatest efficiency and public convenience and does not overlook the matter of good appearance.

Permanency in public improvements relating to city streets naturally is one of the first objects sought and to this end the Committee is giving much consideration to the problem of the disposition of underground utilities, seeking to obviate the constant tearing up of the streets for repairs and extensions.

Inspection of paving work throughout the city to make certain that specifications are complied with, is another line of the Committee's work. Installation of superior lighting systems is another, notable progress in this direction having been accomplished by enlisting the co-operation of property holders. Erection of street signs that shall be clearly read, durable in construction and, being attached to the buildings shall not add to the number of posts occupying the street, is yet another of the Committee's undertakings.

The Committee on Downtown Streets was organized about a year and a half ago. Its personnel consists of August Gatzert, Rosenwald & Weil, Chairman; Henry Beneke, Hibbard, Spencer, Bartlett & Co., Vice Chairman; E. J. Brundage, Richard T. Fox, W. F. Juergens, Juergens & Anderson Co.; William H. Rehm, Hotz & Rehm; Chas. E. Rollins, Jr., Rollins & Burdick; Philip W. Seipp, A. O. Slaughter & Co.; Edward M. Skinner, Wilson Brothers; E. U. Kimbark, The Paper Mills Co., ex-officio.

The problem of street congestion in Chicago being very acute, the undertaking of the Committee on Downtown Streets is in consequence highly important —in fact it is to be doubted whether any movement directed at physical public improvements is of greater importance to Chicago's welfare.

The Committee has formulated a general program of action, features of which are the following:

1. Underground Utilities: Galleries must be provided to contain underground utilities, which shall be readily accessible for repairs, extensions, etc., without disturbing the surface of the street.

2. Street Improvements: The serviceability of the pavement depends very largely upon the manner of its construction; therefore one of the first specific activities of the Committee shall be to inspect each step of paving construction, thus co-operating with the public authorities to make certain that specifications are enforced.

3. Street Signs: These should be attached to buildings to lessen the number of obstructions in the street. A sign modeled after a London sign has received the approval of the Committee and a number are being erected in an experimental way to determine their applicability to Chicago conditions. The sign is of white opaque glass, backed with concrete and mounted in a narrow rust-proof frame, readily attachable to any building. The letters are black, being chemically burned into the glass and when properly mounted the sign is believed to be practically indestructible. In size it is 30 inches long and 6 inches high, the charac-

ters being 4 inches in height. It was described in full in MUNICIPAL ENGINEERING for September, 1912.

4. Street Lighting: In selecting a system of street lighting, individual conditions in various streets necessarily are determining factors. The financial questions involved add other phases to the problem and the Committee's work in this department, which is more fully described elsewhere in MUNICIPAL ENGINEERING has been that form of co-operation with property holders and public authorities which opportunity for immediate practicable work has suggested. The Committee's first undertaking in this line will shortly result in the installation of flaming arc lights in Dearborn street, between Lake and Polk streets. Working with the Dearborn Street Improvement Association, where the plan originated, the Committee on Downtown Streets has been instrumental in securing the consent of three-fourths of the property holders to a plan by which cost of installation and maintenance will be equally distributed. The progress of this undertaking has reached a point where its consummation is apparently a matter of but a few weeks' time.

In the field of inspection of pavement construction, the Committee has performed a highly useful service and undoubtedly has raised the standards of such construction in Chicago. The Committee's engineer, Mr. L. A. Dumond, has given personal attention to this work and it was found that there were a number of directions in which this kind of supervision was quite essential.

There was discovered at times, for example, a tendency to leave the subgrade too high in cases where a dump was not near at hand. This made is necessary either to leave the final grade above city grade or to diminish the thickness of the concrete foundation underlying the surface paving material. Other details, such as the proper proportion of the ingredients in the concrete, were found to repay supervision and in general this field is regarded by the Committee a very productive one.

The Committee is proceeding with care in the formulation of its policies and is basing these upon very wide information, taking steps to exhaust available facilities for procuring all pertinent facts relating to the various subjects comprised. Besides such information as is available in written form, the Committee at its weekly meetings has conferred personally with prominent authorities upon municipal engineering subjects and with city officials and engineers engaged in local improvements. The chairman, Mr. August Gatzert, spent several months in Europe shortly after the Committee's formation, making a personal study of street conditions in foreign municipalities and obtaining from the authorities the results of their own experience in meeting the problems which are presented.

With the problem of subway construction which is before Chicago, that of the construction of utility galleries is closely bound. The attitude of the Committee is that no subway plans should receive the city's approval that do not provide adequately for galleries to house utility conduits.

That there is much waste in public improvements effected without reference to a common improvement program is obvious. When the aim of the Committee to have all street improvements made along lines determined by a comprehensive plan is realized, a plan that shall begin with conditions underlying the pavements and shall include every feature of city streets, it is believed that the large sums of money constantly expended in improvements will yield far more efficient results and that superior street conditions may soon be realized in Chicago.

High French Tax on Signboards

CONSUL CARL BAILEY HURST, LYON.

A heavy stamp tax is about to be levied in this district and elsewhere in France on all signboards that can be seen from any public path, road, or railway. All such advertisements set up, except on the wall of a house or inclosure or within 328 feet of any group of houses or buildings, will be taxed as follows per square meter (10.764 square feet):

Less than 6 square meters (64.583 square feet).....	50	$9.65
Over 6 square meters and less than 10 square meters (107.64 square feet).....	100	19.30
Over 10 square meters and less than 20 square meters (215.28 square feet).....	200	38.60
Over 20 square meters.....	400	77.20

Motorists in particular have campaigned against the wayside signboard, and in some places here restrictive measures have already been taken by the local authorities within their jurisdiction. Many people would like to suppress the signboards in rural districts altogether, but it is considered an encroachment on the personal liberty of a land owner to prohibit him from allowing signboards to be erected on his own property. It is, however, possible, thru legislative enactment, to impose a tax sufficiently high to diminish the quantity of signboards that are increasing in a disturbing manner in some of the most beautiful regions in France.

ROADS AND PAVEMENTS

Wood Block Paving in St. Louis

At present the city of St. Louis has 156,732 square yards of wood block paving. There are now 79,590 additional square yards in course of completion, 5,377 square yards under contract and ordinances are pending for 6,857 square yards.

Wood blocks are being placed on the following streets:

Street Under Work	From	To	Length Feet	Sq. Yards
Delmar	Rosedale	Skinker	1,020	5,062
Delmar	Skinker	City Limits	620	2,451
De Baliviere	Forest Park	Delmar	2,832	14,789
Taylor	Forest Park	Maryland	2,000	7,635
Olive	Channing	Grand	1,180	2,764
Benton	Twentieth	Jefferson	2,438	8,843
Locust	Fourth	Thirteenth	3,055	6,787
Washington	Twelfth	Eighteenth	2,447	9,010
St. Charles	Fourth	Seventh	880	2,891
Franklin	Fourth	High	2,890	9,917
Seventh	Market	Washington	1,332	5,104
Ninth	Market	Washington	1,365	4,337
Total			22,059	79,590

Between the years of 1844 and 1892 St. Louis laid almost eight miles of the old, untreated blocks, representing 146,350 square yards, at a cost of $475,590. This entire area has long since been replaced by other forms of paving. These failures had no effect upon the later use of creosoted yellow pine paving block.

The first test of this form of street paving was made in the spring of 1903, when over 50,000 square yards of wood block were laid in two of the finest residence thoroughfares in the city; namely, Washington and Westminster boulevards, from Grand to Taylor avenues. It was truly a test and a practical one on a large scale, for it represented, approximately, 2¾ miles of roadway, at a cost of some $163,000.

An interval of five years elapsed. The test had been made and the streets had not been found wanting. On the contrary, the test was highly succesful, and during the year 1908, 5,000 yards were laid. This was followed in 1909 by 6,500 yards, in 1910 by 32,000 yards, and in January, 1911, by 10,000 yards, with 16,000 yards under construction. So on March 1, 1911, St. Louis had, in all, about 5½ miles, or 120,600 square yards, of creosoted yellow pine wood block paving.

The foregoing figures do not include the area of wood block streets paved and maintained by the street car companies, which amounts to some 4 per cent. of the city's area.

In St. Louis all the crossings on streets paved with granite blocks in the business district are paved with wood blocks. These clean, smooth crossings have proven a source of great comfort to the shopping public. These crossings aggregate some 5,700 square yards.

Under the earlier contracts, the creosoted blocks were treated with an oil of specific gravity of 1.08 at 38 degrees C. to the extent of 16 pounds of preservative per cubic foot of timber, and were laid at an angle of 67½ degrees with the curb. Under these contracts transverse and longitudinal expansion joints one inch in thickness were used, the transverse joints occurring every 100 feet. The joint filler used under the earlier contracts was coal tar pitch.

Many engineers connected with the treating of paving blocks are of the opinion that, at least on the lighter traffic business streets and in most residence districts, 16 pounds of oil is all that is required for the most successful wood block. Blocks thus treated give much less trouble from "bleeding" and expe-

rience has proven that they last as well as those treated with a larger quantity of oil.

Sand filler is used between blocks.

WOOD BLOCK STREETS. CITY OF ST. LOUIS. Office of the Street Commissioner, St. Louis, July 12, 1912.

The following statement correctly represents the cost of wear and maintenance on the following streets:

(Signed) JAS. C. TRAVILLA,
Street Commissioner, St. Louis.

Streets	From	To	Tot. No. Sq. Yds.	Date Accepted	End of Guarantee	Wear and Tear '08	'09	'10	'11	'12
Washington	Grand	Pendleton	24,643.22	3-26-03	3-26-10	...	...	2.10	14.60	32.10
Washington	Pendleton	Taylor	8,023.00	3-16-03	3-13-10	...	...	...	5.47	46.60
Westminster	Vandeventer	Sarah	4,125.00	8-19-03	8-19-10	4.00	...	...	1.49	4.60
Westminster	Sarah	Walton	12,823.00	10-19-03	10-19-10	...	...	...	....	....
Pine	Third	Fourth	823.95	8-6-08	8-6-18	...	...	...	....	....
Third	Chestnut	Pine	795.31	8-6-08	8-6-18	...	...	...	7.40	....
Olive	Fourth	Twelfth	11,661.00	11-17-09	11-17-14	...	...	...	....	....
Washington	Fourth	Twelfth	10,066.21	10-6-10	10-6-15	...	...	...	....	....
Fourth	Chestnut	Wash'gton	4,944.97	10-6-10	10-6-15	...	...	...	....	....
Washington	Kingshighway	Union	12,329.54	11-12-10	11-12-15	...	...	...	....	....
Rauschenbach	Benton	Hebert	6,217.02	12-2-10	12-2-15	...	...	...	....	....
Gay	Twelfth	Thirt'nth	595.09	1-7-11	1-7-16	...	...	...	....	....
Twelfth	Tyler	Robert	9,489.89	3-1-11	3-1-16	...	...	...	....	....
Twelfth	Franklin	Tyler	5,889.52	3-3-11	3-3-16	...	...	...	....	....
Eighteenth	Cass	N Market	7,263.57	7-12-11	7-12-16	...	...	...	....	....
Eighteenth	Biddle	O'Fallon	3,585.16	9-5-11	9-5-16	...	...	...	....	....
Eighteenth	O'Fallon	Cass	1,530.65	9-5-11	9-5-16	...	...	...	....	....
Twelfth	Hebert	Branch	1,583.11	9-5-11	9-5-16	...	...	...	....	....
Pine	Fourth	Twelfth	5,377.56	11-8-11	11-6-16	...	...	...	....	....
McPherson	Kingshighway	Union	8,186.17	9-8-11	9-8-16	...	...	...	....	....
Eighteenth	Washington	Biddle	4,449.26	1-5-12	1-5-17	...	...	...	....	....
Benton	Broadway	Twentl'th	13,421.59	2-5-12	2-5-17	...	...	...	....	....

The claim, frequently advanced, that it is not practical to lay wood blocks on an appreciable grade is not borne out by the experience of St. Louis, where streets with grades as heavy as 3½ per cent are paved with wood blocks with perfect satisfaction.

The contracts for the earlier streets, those laid in 1903, required a seven years' maintenance. One contract in 1908 called for ten years, but those of recent years included but a five year maintenance clause.

Wood blocks are laid on a six-inch concrete basis and one inch coarse sand cushion, except when a telford macadam roadway is being resurfaced, in which case the old foundation is used.
old curb or curb and gutter is removed and a six-inch granite curb of highest quality is substituted.

As to the efficiency of the wood block pavements which have been laid in St. Louis, a few figures touching on the cost of maintenance might be of interest.

During 1909, the sixth year of contract maintenance of the 50,000 square yards, or one and one-half miles, of the oldest contract in St. Louis, the wear and tear cost was $2.10, which represents about two and one-half square yards repaired. The cause of wear and tear in every case was the sinking of the concrete foundation beneath the blocks. This, of course, was no fault of the wood itself, but had to be charged to wear and tear of the street.

The actual expenditure last year on 50,000 square yards of yellow pine creosoted wood blocks laid on streets in St. Louis in 1903 was less than two-tenths of a cent per square yard for upkeep. The streets are in perfect condition today, showing no evidence of failure or needed repairs.

The Parker-Washington company states that during their seven years' maintenance of 50,000 square yards of yellow pine creosoted wood block pavement laid by them in 1903 they did not spend one dollar for repairs, therefore the total expenditure for upkeep on 50,000 square yards of yellow pine creosoted wood blocks laid nine years has been less than two-tenths of a cent per square yard for maintenance, with every indication that the streets will give the city and property owners as many more years of service.

While the first cost of wood blocks in St. Louis was greater than for other types of pavement, there has been practically no maintenance cost in ten years of service.

The sand bed is used for the purpose of providing a uniform cros-section of the finished pavement. In laying wood blocks the street commissioner found a lack of uniformity in the depth of the blocks and it is difficult to always have the concrete of proper grade without applying a mortar bed; therefore the sand is used for the purpose of taking up these irregularities. The less sand used for the cushion the less opportunity for moisture to be held under the blocks, and from an eco-

nomic point of view it is advisable to use a minimum amount of sand.

Mr. J. C. Travilla, street commissioner of the city, has the following to say regarding the methods of reducing slipperiness of wooden block surfaces, in which he has been very successful:

"The necessity of treating surfaces of hard pavements to lessen their slipperiness has been recognized for some time by the city of St. Louis, and many experiments have been made to alleviate the trouble. In many ways, and for many conditions of the pavement surface, sand has been generally used. Fine cinders, too, have found their way to the surface of slippery pavements, their effectiveness being correspondingly shorter lived compared with sand because of the lesser wearing qualities.

"Frequently in dry, cold weather a dusty condition of the pavement surface alternates with slipperiness. As a means of preventing both nuisances, it was first thought necessary to heat sand, incorporate oil, and then spread the mixture on the street. This process is rather expensive where mechanical means for drying and oiling the sand, previous to spreading the latter on the pavement, are not available. Hand turning during the process of drying, and then mixing the sand with oil in asphalt pans, is a slow, tedious, laborious and expensive process.

"From the standpoint of dust, it is essential that the sand carry as much oil as possible, and still permit of satisfactory hand distribution. If an attempt be made to store this hot oil-sand in a bin for future use, much of the oil will be found at the bottom of the sand after twenty-four hours. The hot oil, having its normal viscosity greatly reduced, tends to percolate through the sand pile, from grain to grain, to the bottom of the bin, resulting in a sloppy mixture at the floor. A coarse sand, heated, will carry about five per cent by weight of an 18 to 20 degree B. oil as a maximum. Dry sand, at a lower temperature, will, of course, carry a larger per cent by weight of oil. By expermimenting, it was found that more lasting and better results can be obtained by applying a thin layer of oil first and then spreading the sand.

"By using a specially designed wagon, fitted up with fan sprays and a hand air pump, for producing a pressure on the oil, the oil, above mentioned, has been spread on wood block asphalt streets at the rate of about 0.15 gallons per square yard, at an air temperature as low as 15 degrees Fahr. Under a pressure of from 10 to 15 lbs. to the inch, with the oil at a temperature of from 250 to 350 degrees Fahr., no difficulty was encountered in spraying the oil at the above air temperature. A liberal coating of coarse sand was then

WOOD BLOCK PAVING IN ST. LOUIS.
Laying Yellow Pine Creosoted Blocks on Washington Avenue Between Union and Kingshighway. A 3.5 Per Cent. Grade is Maintained in the First 600 Feet East of Union Avenue, to Entire Satisfaction.

applied, which, under traffic, with the oil soon formed a mat, assuring a foothold for horses.

"'We find it convenient to first put the sand in small piles along the side of the roadway, and then by using small amounts, it is distributed uniformly over the surface. A sand-spreading wagon, however, would be more economical.

"The amount of sand used has been about 0.09 cubic feet per square yard. The oil applied first tends to hold all the sand in place, and prevents rapidly moving vehicles, such as automobiles, from throwing it to the sides. For an old asphalt pavement, this treatment would necessarily tend to give life to the surface, as well as seal small cracks, hence tend to prevent the entrance of moisture. The life and usefulness of this process varies from four to eight weeks, depending upon traffic. On grades, this surface application is said to be invaluable to horses. The total cost, including materials, labor, teams, and the preparation of the oil, varies from 1 to 1½ cents per square yard.

"For economy, the whole area of residential streets is not treated, but the oil is kept about four feet from the curb, and there is left untreated a strip about four feet wide in the center of the street. This method of distribution requires but two trips of the wagon for each half of a 40-foot roadway. Experience in St. Louis shows that rapidly moving automobiles tend to run towards the center, but remain to the right of the crown."

Wearing Surfaces for California's State Highways.

The League of California Municipalities appointed a committee at its last meeting to consider the progress of the State Highway Commission, the committee being composed of three city engineers, Chris P. Jensen, of Fresno; S. J. Van Ornum, of Pasadena, and J. J. Jessup, of Berkeley.

A report of progress was made recently, which is excellent, except that perhaps it has too marked a preference for roads practically equivalent to city pavements. This is doubtless due to their practice as city engineers in part, and is also due in part to the fact that under most California conditions of climate and materials the city paveemnts and the road surfaces have approached the same general design, tho beginning at opposite ends of the scale.

The route of the state highway system, running north and south, is located approximately in the law and branches connecting it with the county seats of the counties east and west of those in which it lies are provided for. The State Highway Commission has located 2,300 miles of the main routes and 400 miles of laterals. The $18,000,000 appropriation makes the average expenditure per mile $6,667, which the committee considers insufficient for the best class of work.

Specifications have been adopted for the construction of about 100 miles of the selected routes.

Austin B. Fletcher, the state highway engineer, states that the principal characteristics of the state highways will be rights of way 60 feet wide, as direct lines as possible, gradients not exceeding 7 per cent., even in the mountains, open curves never of less than 50 feet radius, enough culverts and of sufficient capacity for drainage, traveled way of 21 feet, except 16 feet in the mountains, center surfacing 15 feet in width to be such as to be hard and smooth at all times of the year, smoothly graded roadsides reserved for future tree planting.

For the main roads the choice seems to be between oil-macadam and concrete with bituminous surface, the latter being much more expensive.

The committee of city engineers believe that the 2,700 miles of road required should be graded and as much pavement should be constructed as the funds will permit, believing that this will be more certain to secure additional appropriations than an attempt to make a road thruout of the average cost stated. They say:

"As a commentary on the matter of oil-macadam, we would call to mind that Los Angeles county, alone, spent $3,500,000 on oil-macadam highways, and that in the latter part of 1911, when practically all of the bond issue was spent, the grand jury of the county met and in a final report stated, as we recall the words, 'that the oil-macadam roads in Los Angeles county were an absolute failure.'

"It is our belief that particularly up and down the San Joaquin Valley, motor trucks will come into use immediately upon the completion of the highway for the purpose of transporting freight from terminal points, and this factor should be taken into careful consideration before specifications are adopted for such highways.

"Having in mind the increasingly greater traffic demands which will be made after the completion of the highway, we would suggest three classes of pavement as being much more permanent and satisfactory in every way than those proposed:

"1. A standard pavement consisting of a cement concrete base, and a bituminous wearing surface at least 2½ inches thick, constructed according to best modern practice; this form of pavement has been proven to be successful in large cities

and is considered a standard by all municipal engineers.

"2. A pavement consisting of a 5-inch cement concrete base, as before, but overlaid with a 2½-inch thickness of bituminous rock, similar to many pavements in San Francisco and other cities.

"3. A pavement commonly known as asphalt concrete, consisting of a base course 3 inches thick and a wearing surface 2 inches thick, each course to be separately rolled to complete resistance. This form of pavement has been in use for many years and has proven entirely satisfactory.

"A bituminous concrete similar to the asphaltic concrete might be used to advantage along the line of the coast route. For the present highway purposes in most localities, we consider that the asphalt concrete form of pavement would be in all respects, the best pavement to be had under existing circumstances.

"In conclusion we would remind your body that approximately 70 per cent. of the burden of taxation wil fall upon the incorporated cities. If poor pavements, or experimental pavements are laid between cities, they will be the greatest sufferers and would, therefore, have the best right to be heard in the matter of pavements."

Street Railway Track Construction in Springfield, Mo.

The franchise of the Springfield, Mo., Traction Company requires it to pave its tracks and two feet outside the rails when the city paves the street. During 1911 the company paved more than three miles of line under the supervision of A. C. Polk, who has described the work for the American Society of Civil Engineers.

Rails

The rail has a 7-inch, 70-pound, T-rail section. Each rail is 62 feet long, fastened to steel ties 4¼ inches deep imbedded in concrete, and under each rail is a longitudinal concrete beam 9 inches deep below the general bottom of the 5-inch concrete pavement foundation or 12 inches below the bottom of the rail, each being reinforced with two ½-inch twisted steel rods. These beams are 22 inches wide and the reinforcing rods are set near the bottom and 6 inches each side of the center line.

Steel Ties

Under the rail joints the steel crossties are of I section with top flange 8½ inches and bottom flange 4½ inches wide web 4¼ inches high and with a weight of 20 pounds per foot. They are 6 feet 8 inches long and are set in the concrete foundation of the pavement and a concrete beam is placed under each crosstie, 30 inches wide and extending 3 inches below the bottom of the longitudinal concrete beam, or 10¾ inches below the bottom of the crosstie. This makes the distance from top of rail to bottom of lowest concrete 22 inches. Ties are spaced as nearly 5 feet apart as location of rail joints permits, and the ties intermediate between rail joints have 6 and 4-inch flanges and the concrete underneath them is at least 2 inches thick and extends 4 inches each side.

Joints

Special lugs and T-headed bolts with square shoulders next to the head were used to fasten the rails to ties.

Six-bolt continuous joints were used to join rails together. The rails and joint plates were carefully cleaned and polished with files and emery cloth, removing all scale, rust and particles of dirt and leaving the surfaces bright. The contact parts were then greased, the joint plates fastened and the bolts tightened by special methods until a wrench with a 30-inch handle could not stir them. These joints require no further electric bonds and similar joints showed a first-class negative return circuit after two years under traffic.

Laying Track

Except in the case of asphalt, the construction began with the contractor laying the street for the city on each side of the track or tracks. The old track was then moved to one side or the other on the completed pavement and the excavation on the street railroad area was made, first 10 inches being taken out over the whole area, then two longitudinal trenches under the rail positions 9 inches deep and 22 inches wide and cross trenches under rail joint locations, 30 inches wide and 12 inches deep, with trenches about 2 inches deep and about 8 inches wide under each intermediate tie.

The new track, put together as above described, was then put in place and supported on small piers of old brick under every other tie and under the rail. Oak wedges were used on top of the piers to give the final surface, which was kept slightly ahead of the concreting gang. The two twisted reinforcing rods were also put in place and supported at intervals on bricks, raising them about 2½ inches above the ground. Under each joint two extra 4-foot lengths of the steel rods were placed. Concrete was then put in place, the bricks and wedges as well as rods, rails and ties being imbedded in the concrete. Between rails and tracks the concrete was crowned slightly to conform with the finished grade of the pave-

ment, a special templet being used to give the exact form.

On part of the work the mixer was mounted on car trucks on the old track temporarily laid on the pavement and driven with a 10-h.p. motor. It was supplied with material by a work train with flat cars running on the temporary track. This method blocked traffic on the track in use, requiring transfer of passengers around the concreting in progress when there was but a single track, and there were frequent delays in delivery of material. On other parts of the track the mixer was mounted on wide tired wheels, driven with a 15-h.p. motor and having a charging bucket. Materials were delivered by wagons in proper proportions ahead of the mixer. This method delayed traffic but little and the mixer was seldom delayed for lack of material.

A 1-inch sand cushion was used under the brick. Along each rail a 2x4-inch piece of timber was laid, then a longitudinal course of brick parallel to the rail and ½ inch below its top, then the transverse rows were laid. Before grouting the pavement the timber along the rail was removed and the space was filled with concrete so as to leave 1 inch of depth for flanges of wheels to run in. After this had set the rest of the pavement was grouted.

The construction is believed to be permanent, similar track showing no movement after 3 years in operation and being in as good condition as on the day it was finished. This makes the cost of $5 per linear foot of single track seem reasonable. The method is reported to require less concrete than that of filling in and around wooden ties, and it certainly places the concrete in the most necessary places, thus promoting permanency. It is believed that this roadbed will outlast two or more sets of rails under heavy traffic. If the fastenings to the ties are properly designed the rails can be replaced without disturbing the foundations.

New Stadium Bridge for Harvard

The Massachusetts Metropolitan Park Commission has prepared plans for a handsome new three-span concrete arch bridge across the Charles river from North Harvard street in Brighton to Boylston street in Cambridge, giving access to the Harvard Stadium and Soldiers' Field. It takes the place of an ancient wooden bridge which has outlived its usefulness.

The bridge will be ornamented with granite and red brick trimmings to conform with the local structures. It is 440 feet long and 64 feet wide, and will cost about $200,000, for the bridge proper, and some $50,000 for temporary bridge and approaches. To offset the increased obstruction of the channel by piers and abutments, the river is widened 25 feet at the bridge. It is set 13 feet higher than the old bridge to give the 16-foot clearance which the law requires for a bridge without a draw. This act of Congress was passed primarily for the benefit of this bridge.

It is said that Larz Anderson, a Harvard alumnus, will pay most of the expense of the bridge proper. John R. Rablin is the engineer of the park commission, having the plans in charge, and Wheelwright, Haven & Hoyt are the architects.

A Delayed Automobile Patent.

On May 8, 1879, George B. Selden, of Rochester, N. Y., made application for a patent on a "road engine," which was divided and a new application filed September 7, 1895, upon which a patent was issued June 4, 1912, No. 1,028,501.

The patent is on the combination with the body of a road engine or self-propelling vehicle of a driving and steering truck therefor, the driving and steering devices both acting upon the front truck of the vehicle.

The delay in the issue of this patent is unconscionable and demonstrates the possibility of manipulating laws or regulations so as to extend the practical life of a patent much farther than the seventeen years which the issued patent has to run.

Modern automobile manufacturers do not ordinarily put their driving gear on the front axle, so that this patent is apparently useless. Its appearance in the list of patents granted this summer gives a flavor of ancient history to the ordinarily up-to-date *Patent Office Gazette.*

ORGANIZATIONS & INDIVIDUALS

American Road Builders' Association

Governor Judson Harmon of Ohio has evinced his interest and his sympathy with the efforts of the American Road Builders' association to the extent of addressing letters to the governors of all of the other states, strongly indorsing the purposes for which the meeting has been called and requesting the appointment of official delegates. Although this letter was sent out only a short time ago, and although some of the chief executives to whom the leter was addressed were absent from their states, delegates have been appointed by Governor O'Neal of Alabama, Governor Deneen of Illinois, Governor Oddie of Nevada, Governor McDonald of New Mexico, Governor Burke of North Dakota, Governor Colquitt of Texas, and Governor Mann of Virginia. Governor Brown of Georgia has signified his intention of complying with the request, and Governor Foss of Massachusetts, Governor Cruce of Oklahoma and Governor Aldrich of Nebraska have taken steps to name delegates.

The meetings and exhibits will all be held in Music hall, Cincinnati, O., on Dec. 3-6. The city officials and citizens of Cincinnati, as well as the state officials of Ohio, are co-operating with the American Road Builders' association and putting forth every effort to make the 1912 convention the most successful ever held.

The Central States Water Works Association

The sixteenth annual convention of the Central Water Works association was held in Detroit, Mich., on Sept. 24 to 26, with headquarters at the Cadillac hotel.

The following papers were read: Efficiency of Coagulating Basins, by W. T. Monfort; The Great Lakes as a Water Supply, by Capt. J. C. Beardsley; Reaching the High Pressure, by H. E. Cole; Treatment of Public Water Supplies with Hypochlorite, by W. H. Dittoe; Stop the Waste, by A. L. Holmes; Depreciation, by Halford Erickson; Benefits and Restrictions of the Wisconsin Public Utility Law, by C. B. Salmon; Fire Protection, by C. W. Wiles; Water Rates, by Philip Burgess; Description of Detroit Water Plan, by George H. Fenkell; Description of Akron, O., Water Plant, by H. H. Frost.

U. S. Civil Service

The U. S. Civil Service Commission will hold examinations as follows:

October 16-17—Engineer draftsmen in the office of the supervising architect, at salaries of from $1,600 to $2,000 per annum.

October 23—Laboratory assistant in ceramics in the bureau of standards, Department of Commerce and Labor, at salaries of from $900 to $1,200 per annum.

The Cement Shows

The uniform success which has attended the Cement Shows in the past has led to the perfection of plans for exhibitions in the cities of Pittsburgh and Chicago, two important centers, both easily accessible from all points in a big and active territory in concrete construction.

It will be noted that the exhibitions will be held somewhat earlier in the season than heretofore, the one at Pittsburgh being December 12-18, and the one in Chicago January 16-23. The experience of the management leads to the conclusion that December and January offer ideal conditions for the holding of successful trade exhibitions. In December and January manufacturers and salesmen have the most leisure for attending exhibitions. Dealers have more time to make trips away from business. Contractors, engineers and architects are not so busy preparing plans, specifications and estimates. Building operations are less active than at any other time and there is little in the building line to occupy the attention of the trade

The National Association of Cement Users will join in the Pittsburgh meeting by holding their ninth annual convention during the Cement Show.

Calendar of Technical Meetings

AMERICAN ROAD CONGRESS—Annual Meeting, Atlantic City, N. J., September 30 to October 5. Logan Waller Page, president, Washington, D. C.

NEW YORK FIRE EXPOSITION AND INTERNATIONAL CONFERENCE OF FIRE PREVENTION, PROTECTION AND EXTINGUISHMENT — Seventy-First Regiment Armory, New York City, October 2-12. A. D. V. Storey, secretary, 1269 Broadway, New York, N. Y.

AMERICAN GAS INSTITUTE—Annual Meeting at Atlantic City, N. J., October 16-18. Geo. G. Ramsdell, secretary, 29 West 39th street, New York.

AMERICAN ASSOCIATION FOR THE PREVENTION OF THE POLLUTION OF RIVERS AND WATERWAYS—Annual Convention at Cleveland, O., October 23-24. H. De B. Parsons, secretary, 22 William street, New York.

AMERICAN SOCIETY OF MUNICIPAL IMPROVEMENT—Annual Convention, Dallas, Tex., November 12-15. A. Prescott Folwell, secretary, 50 Union Square, New York City.

AMERICAN ROAD BUILDERS' ASSOCIATION—Ninth Annual Convention, Music Hall, Cincinnati, O., December 3-6. E. L. Powers, secretary, 150 Nassau street, New York City.

NATIONAL ASSOCIATION OF CEMENT USERS—Annual Convention, Pittsburgh, Pa., December 12-18. R. L. Humphrey, president, Harrison Building, Philadelphia, Pa.

Technical Associations

The fortieth annual convention of the New York State Firemen's association, held at Newburgh, elected the following officers for 1912-13: Fred A. Davis, Fort Edward, president; Thomas Honohan, Frankfort, secretary; and John P. Powers, Ossining, treasurer.

At the regular meting of the Municipal Engineers of the City of New York, held on September 25, a paper was presented by Fred W. Lindars, entitled "The Segregated Budget as Applied to Municipal Engineering Work."

At the third annual convention of the Pacific Highway association, held in San Francisco, Cal., the following officers were elected: President, Judge J. T. Ronald, Seattle; Frank M. Fretwell, Seattle, secretary; Falcon Joslyn, Fairbanks, vice president for Alaska; A. E. Todd, Victoria, and F. R. McD. Russell, Vancouver, vice presidents for British Columbia; Alfred Thompson, Dawson, vice president for Canadian Yukon; A. G. Briggs, San Francisco, and F. W. Jackson, San Diego, vice presidents for California; Frank B. Riley, Portland, vice president for Oregon; Samuel Hill, Maryhill, vice president for Washington.

A. Lincoln Fellows presented a paper on "The Cherry Creek Problem," before a meeting of the Colorado Association of Members of the American Society of Civil Engineers, held on September 14.

Among the papers presented before the convention of the New England Water Works association, held in Washington, D. C., on Sept. 18-20, were the following: State Control of the Design and Construction of Dams and Reservoirs; actual Practice in Eastern Connecticut, Charles E. Chandler, C. E., Norwich, Conn.; Certain Legal Aspects of Water Power Development in Maine, by Cyrus C. Babb, chief engineer Water Storage Commission of Maine, Augusta, Me.; State Control of Dams in Pennsylvania, by Prof. Frank P. McKibben of Lehigh university, South Bethlehem, Pa.; Reasonable Requirements Imposed Upon Water Works Systems by the Fire Protection Problem, by Clarence Goldsmith, C. E., superintendent of High Pressure System, Boston, Mass.; The Organization and Administration of a Supply Bureau, illustrated, by E. C. Church, C. E., secretary Department of Water Supply, Gas and Electricity, New York, N. Y.; State Regulation of Public Utilities, by Morris Knowles, director Department of Sanitary Engineering, University of Pittsburgh, Pa.

The fourth National Conservation Congress will be held in Indianapolis, Ind., on October 1-4. Vital Resources will be discussed in many sections by men whose knowledge and achievement command world-wide attention. Forests, waters, lands and minerals will receive prominent attention.

At the closing session of the International Association of Fire Engineers, held in Denver, Col., September 20, New York City was selected as the next meeting place. Chief H. F. Magee, Dallas, Tex., was elected president; Chief T. W. Haney, Jacksonville, Fla., first vice president; Chief Hugo R. Delfs, Lansing, Mich., second vice president. Chief James McFall, Roanoke, Va., was re-elected secretary, and Chief George Knofflock, Mansfield, O., treasurer.

The sixteenth annual convention of the League of American Municipalities was held in Buffalo, N. Y., September 18, 19 and 20. Among the subjects discussed were: City Charters and the Short Ballot; Importance of the City of Modern Society; Playgrounds, and How to Acquire Them; Civic Awakening; Relations of the Library to the City; Taxation.

The twelfth annual convention of the Union of Canadian Municipalities was held at Windsor, Ont., on Aug. 27-28. Among the more important subjects discussed were the following: Equitable Municipal Taxation, by T. A. Clarke; The Georgian Bay Canal and Its Water, by Mayor Hopewell, Ottawa; The Price of Cement, by Controller Harvey, Winnipeg; Winnipeg's Hydro-electric Power Plant, by J. W. Cockburn; and Municipal Government by Commission, by S. M. Wickett. The secretary-treasurer of the

Union is W. D. Lighthall, Westmount, Que.

American Society of Municipal Improvements

The city of Dallas, Tex., is proposing much for the entertainment and instruction of its visitors at the convention of the American Society of Municipal Improvements, to be held November 12 to 15, with a meeting of the general committee on standard specifications on the 11th. President E. A. Kingsley, Little Rock, Ark., is arranging for special accommodations on a train from St. Louis, concerning which he will send full information to all asking for it, as soon as arrangements are perfected. At but little additional cost tickets can be purchased to Galveston or any other desired point, which will be good through Dallas, and give opportunity for stop-overs at the principal cities in Texas and Oklahoma.

Dallas is a city which is very fully improved with pavements, sewers, sidewalks, water works, parks, playgrounds, electric railways and lights, and has much of interest in these lines, particularly in its solution of its water problem.

American Road Congress

The second road congress held under the auspices of the American Association for Highway Improvement is in progress at Atlantic City as this number of MUNICIPAL ENGINEERING is issued, and is doubtless as excellent as the first congress. Its devotion to the practical side of the question has been called in question lately by some who would like to relegate it to the field of promotion only, but the program of the congress is sufficient refutation of such puerile charges.

The construction and maintenance section has a program extending over two full days, with papers by state and county highway commissioners and engineers, city and consulting engineers in charge of street and road construction, contractors and experts on paving and road-making materials. Fuller statement of what was actually presented will be given next month.

This is the first national highway association under any name which has not been under the guidance or control of some special or individual interest, and this fact has given it a standing and an authority which no other association has had heretofore.

Personal Notes

John McMillan has been appointed city engineer of South Pasadena, Cal., succeeding B. Dupuy.

Frank LaF. Anders has been reappointed city engineer of Fargo, N. D., in which capacity he has been serving since 1910.

G. W. Pearsoll has resigned as city engineer of Park City, Tenn., and Frederick Thomas has been appointed to succeed him.

J. B. Logan, formerly an engineer with the Maryland State Roads Commission, has been appointed city engineer of Annapolis, Md.

C. J. Renner of Mount Vernon, N. Y., has been appointed city engineer and superintendent of streets, water and sewers of St. Albans, Vt.

Prof. William J. Carrel of the department of civil engineering, State University of Kentucky, has been appointed bridge engineer of the Kentucky State Highway Department.

Prof. Granville R. Jones and Prof. R. B. H. Begg have been appointed members of the engineering faculty of Kansas university. Their field will be sanitary, municipal and hydraulic engineering.

David H. Ray, Assoc. Am. Soc. C. E., for the past two years chief engineer of the Bureau of Buildings, New York City, has resigned to enter private practice as a consulting engineer, with offices at 27 West Thirty-third street, New York City.

Francis F. Longley, Assoc. M. Am. Soc. C. E., who this year became professor of civil engineering at Harvard university, has been admitted to partnership in the firm of Hazen and Whipple, consulting engineers, 103 Park avenue, New York City.

Michael M. O'Shaughnessy, M. Am. Soc. C. E., and chief engineer of the Southern California Mountain Water company, has been appointed city engineer of San Francisco, Cal., by Mayor Rolph. Mr. O'Shaughnessy succeeds Marsden Manson, resigned, and his position carries with it the highest salary on the regular city payroll, $15,000 per year.

Charles K. Walker, formerly superintendent of the water department of Manchester, N. H., died in that city on Sept. 10. He was born in 1830 and was educated at Bedford academy, studying civil engineering later under Gen. George Stark, at Nashua, N. H. In 1875 he became superintendent of the Manchester water works, which were built in 1874, and since that time he had held the position continuously.

MACHINERY AND TRADE

Street Signs and Sign Posts

Figure 1.

There has recently been placed on the market a very strong, durable and economical sign post. The main standard is of 2½x2½x 3/16-inch angle iron, of the proper length to hold the signs 7 or 8 feet above the ground. Signs are attached in a very simple manner to a square iron casting, with a wrought iron bolt, cast in the center of the cast iron holder, to which are attached four signs, placed back to back in pairs, running at right angles to each other, or in other words, a four-way sign, fastened together with brass bolts as shown by Fig. 1.

These posts are made for placing either in the ground in the parkway or for placing on the cement sidewalks in the business districts. The first mentioned is to be placed in the ground thirty inches. The bottom of the angle iron post being first flattened and then turned at a right angle, so that the bottom end has a wide horizontal flange and to this is securely riveted a 3/16-inch plate 10x10 inches to set in the bottom of the post hole, above which concrete can be placed if deemed necessary to more securely hold the same in position. At the air line, or more generally termed the ground surface line, and extending ten inches downward is another angle iron plate 4x4x 3/16-inch securely riveted to the main angle iron standard. This affords lateral resistance from four directions, and at the same time serves the purpose of giving double strength and double thickness at the point where there is the greatest strain on the post, and where the rusting and corroding usually take place in all posts, just at the point where the air, water and earth come together.

The post to be used in the business district, which is to be set on and secured to cement sidewalks, has a heavy cast iron base extending 29 inches above the sidewalk, and this cast iron base is reinforced in the back by the angle iron standard itself, which runs clear to the bottom of the post and is securely riveted to the iron casting, giving to the post very great strength at this point.

Figure 2.
STREET SIGNS AND SIGN POSTS.

Fig. 2 illustrates the style of bracket adopted by the city of Chicago for holding street signs and attaching same to trolley poles, electric light poles, etc. Provision is made for attaching either to iron poles or posts as well as to wooden posts. This bracket is very simply constructed and is strong and substantial and calculated to hold four street signs, or in other words, two pairs of signs, technically called a four-way sign.

The Mercury Truck in Municipal Service

Light motor driven apparatus is being used in all departments of municipal work. Contractors who are handling work in various parts of the city can, by using such a truck, cover their work with greater ease and rapidity and can

THE MERCURY TRUCK IN MUNICIPAL SERVICE.
Truck Used by Chicago Telephone Co.

make deliveries of supplies and materials without hindrance to the work which is going on.

City engineers and park commissioners who are compelled to look after various improvements in remote parts of their cities or districts can, and in many cases are, already using light trucks of this class. For carrying instruments, light materials and light equipment which are constantly in demand and which must be transported quickly from place to place, no other means of transportation begins to fill the requirements so admirably.

THE MERCURY TRUCK IN MUNICIPAL SERVICE.
Truck Used by Peoples Gas Light & Coke Co., Chicago.

In preparing the following figures, based upon averages taken from cost records furnished by municipal owners of horse equipment and municipal users of Mercury trucks, W. A. Zimmerman, of the Mercury Manufacturing Co., Chicago, has endeavored to draw an equitable comparison, but has favored the horse in some instances.

He states that one Mercury truck will readily displace and do the work of three horses and two wagons, and at an annual saving which will more than pay for the truck.

Cost of Horse Equipment for a Period of Five Years.

Cost of three horses	$450.00
Two wagons	150.00
Three sets harness	90.00
Feed, shoeing and veterinary, 3 horses, each at $20 per mo	3,600.00
Repairs, 2 wagons, $7.50 per month each	75.00
Painting, 2 wagons, $25 per year each	250.00
Repairs, 3 sets harness	25.00
Two drivers, $12 per week	6,240.00
	$10,880.00

Cost of One Mercury Truck for a Period of Five Years.

Cost of one Mercury truck	$800.00
Gasoline, daily average 30 miles, 300 days per year	375.00
Barn or garage rental	600.00
Lubricating oil	300.00
Transmission grease	50.00
Recharging batteries	21.50
Repairs, $10 per month	600.00
Painting, $25 per year	125.00
Tire replacement, based on 1 cent per mile	410.00
Incidentals, cost of oil for lamps, etc.	175.00
One driver, $12 per week	3,120.00
	$6,576.50

Savings in five years, $4,303.50.

Expert's Opinion on Oklahoma Asphalt

Below we append the opinion of S. F. Peckham, A. M., Chemist of the Department of Finance, New York City, upon the improvement that has been made to Oklahoma asphalt pavement by the addition of bitumen and sand to soften and temper limestone asphalts. This improved form of Ardmore rock asphalt pavement is far superior to anything that was laid in the earlier stages of the use of the material. Mr. Peckham says:

"My attention has been called to the present system of mixing the ingredi-

ents used by the Shelby Downard Asphalt Company, in which the bitumen used to soften the mixture of asphalt rock (bituminous limestone and bituminous sandstone) is extracted from native bituminous sand found in the immediate vicinity of the deposit of the other rocks. This bitumen is a maltha that is readily separated from the sand, with which it is found in nature by means of boiling water. It has, therefore, never been exposed to a temperature above the boiling point of water, and consequently has not been "burned." This method of procedure results in a minimum use of heat to effect a mixture of ingredients for street service and avoids one of the most potent sources of bad surfaces, which are accompanied by careless handling of materials otherwise of an unexceptionable excellence.

"This method of procedure resembles that which has been followed with such excellent results by those who are in European countries, using the rock asphalt deposit of Seyssel and Neufchatel, wherein the bitumen extracted from the poorer portions of the rock is used to soften the richer portions, thus introducing into the mixture no bitumen of a foreign nature.

"I can see no reason why similar satisfactory results should not follow this treatment of our natural asphaltic rock which occurs in such abundance in Oklahoma, and I most cheerfully endorse such management as following the lines indicated by experience and scientific theory.'

An Effective Earth Handling Grader

An elevating grader loading into automatic dump wagons is a system of earth-handling which has developed into the most popular of the age, for the reason practical experience has proven that where it is possible to use an elevating grader that it will do the work with a greater degree of economy than is possible in any other way.

This illustration shows the New Era elevating grader made by the Austin Manufacturing Company, of Chicago, and also the Austin contractors' dump wagon, on work done under the West Park Commission of Chicago.

The New Era elevating grader has been on the market and in use for more than forty years, and its reputation as an economical and reliable earth-handling machine is well established among municipal, railroad and other contractors.

AN EFFECTIVE EARTH-HANDLING GRADER.
Machine at Work in West Park District, Chicago.

The ordinary elevating grader when employed for building a grade, levee or embankment, and when used for making canals where the earth is not to be delivered beyond the direct scope of the elevator or carrier of the machine, will handle in a day's time of ten hours a thousand cubic yards of material, and where the conditions are fair, the machine will do even better. The working force required to handle this amount of earth, if horses are used, is six teams and three men, and, therefore, the cost of handling the amount of earth stated is the wages of this outfit per day. Appreciating that the modern traction engine can be em-

ployed with a greater degree of economy than horses, many of the owners of elevating graders now use a traction engine for power instead of teams.

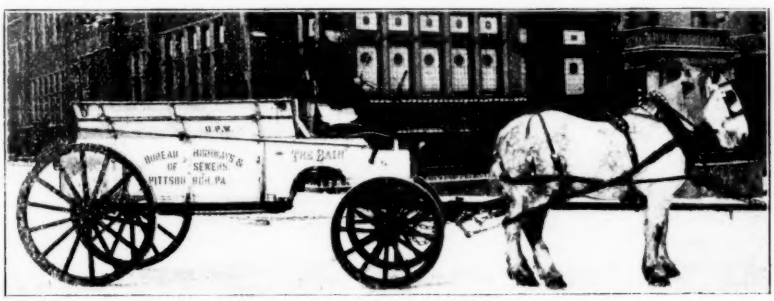
The ordinary elevating grader weighs about 9,000 pounds, and being mounted on wheels of large diameter, is easily transported from place to place, and can be moved to work remote from transportation facilities with very little expense.

These machines are not only used on railroad construction largely, but are also employed for making canals and ditches, in the construction of dams and reservoirs and for road and street building, and they will be found in use wherever work of this nature of any importance is being done.

Contractors having earth handling to do, who are not familiar with machines of this kind, will do well to investigate the economy with which they can be employed before buying their equipment.

Municipal Dump Wagons

The accompanying photograph shows one of the prize winning dump wagons owned by the city of Pittsburgh, Pa., and made by the Bain Wagon Company, of Kenosha, Wis.



MUNICIPAL DUMP WAGONS.
Bain Wagon in Service in Pittsburgh.

This type of dump wagon is decidedly practical and is being used by municipalities in all sections of the country. Only one lever is employed for either closing the doors or dumping the load. Because of the large drum, on which the chain is wound, it is necessary to move the lever forward and back only a few times. Only one chain is used. It is impossible to dump the load by accident. The shaft and drum are placed across the front end of the wagon. This design distributes the strain and prevents the right hand front corner from sagging.

The doors are hung by heavy loops instead of hinges. This allows them to be raised about eight inches and prevents them from being torn off when moving forward after dumping. The doors close almost water-tight.

The steel axles are reinforced by heavy hickory bed pieces, securely clipped on, which strengthens them and prevents springing or breaking. No malleable iron standards are used. The neck is reinforced by a plate of sheet steel both inside and outside, running back to the forward side trap.

The wheels are made with oak hubs, dodged mortised; oak rims and oak or hickory spokes. They are soaked in hot linseed oil, and the tires are set hot in the old-fashioned way.

Technical Advertisers

An evidence of the increasing attention being given to the most efficient methods of advertising and marketing engineering and technical products appears in the announcement of the formation of Wightman & Richards, technical department of Joseph A. Richards & Staff, General Advertising Agents, Tribune building, New York City, representing the association of Joseph A. Richards, Lucius I. Wightman and Paul Morse Richards.

Joseph A. Richards is the head of the agency, having his name, founded by Joseph H. Richards in 1872, and since identified with some of the most conspicuous national successes in advertising salesmanship. Mr. Wightman is an engineer who has for many years specialized in the advertising and marketing of machinery and engineering products, and brings to the association several important technical accounts. Paul Morse Richards is a publisher, sales manager and advertising made of wide experience, until recently with the "Motor World,"

and prior to that, advertising manager for "Power" and other technical journals. His extended experience will aid in the conduct of advertising, selling and marketing campaigns.

A New Road Oiling Machine

The economy of treating city streets and country roads with asphalt oil or coal tar preparations has been so satisfactorily demonstrated, where carried on under favorable conditions, that such practice is no longer looked upon as an experiment. Aside from selecting what oils or tars are best suited for the local requirements, the most important consideration is the selection of a machine which will handle the dust-laying compound in a satisfactory manner.

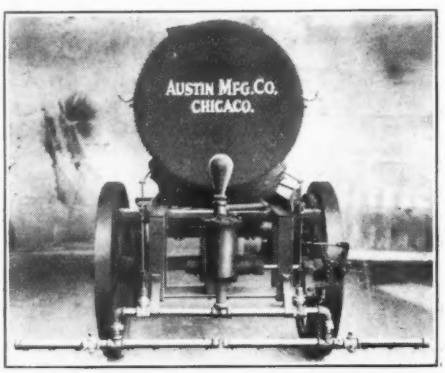
The Austin Manufacturing Company, in an effort to design a street and road oiling machine which would meet engineers' and contractors' specifications, has spent some time in experimenting, which has resulted in the presentation of a power oil distributer of exceptional merit.

The distributing apparatus consists of a force pump driven by gearing attached to the right hand rear wheel of the sprinkler truck, and the oil being forced under air pressure thru especially designed nozzles which give a fan-shape discharge. This machine differs from others of the same general character in that all variations of the discharge and of the air pressure are controlled by the driver from the front seat.

The sprinkler shown in the accompanying illustration is designed for handling the lighter grades of oils and tars, and is intended more for dust-laying purposes than for new construction.

The manufacturers claim for this machine that it combines simplicity of design with efficiency in operation to a degree not heretofore obtained. The machine, when working to its full capacity, delivers a spray 8 feet in width, which, however, can be reduced by 2 feet at a time as the occasion demands. The spray pipes are so mounted that in striking an obstruction they are not damaged, but, on

A NEW ROAD OILING MACHINE.
Side View of Oiling Machine.

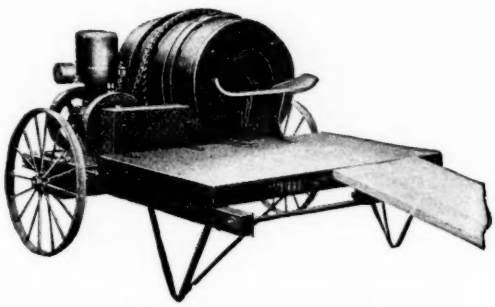


A NEW ROAD OILING MACHINE.
Rear View Showing Control Mechanism.

the other hand, swing aside, and after the obstruction is passed they can be thrown back to the original position. The quantity of oil varies according to the air pressure, which is controlled by the driver, and the present style of machine gives a variation of from 1/20 to ¾ of a gallon per square yard. The spray is uniform the full width of the discharge, and the quantity of oil can be increased or decreased instantly as the condition of the roadbed may require.

"The Standard" Junior Mixer

There has been such a demand for a small machine modeled along the lines of "The Standard" low charging concrete mixer that the Standard Scale & Supply Co., 1345 Wabash avenue, Chicago, has perfected "The Standard" Junior mixer. This mixer is especially adapted for sidewalks, curbs, gutters, small foundations, culverts, etc. Any contractor who is mixing by hand or with a cumbersome



"THE STANDARD" JUNIOR MIXER.

continuous or heavy batch mixer should look into the merits of this machine.

"The Standard" Junior mixer is low in first cost, low in operating cost and gives a better mix with less cement, and in mixes twice as much material with the same amount of labor as hand mixing.

The mixer complete on trucks, engine and all, weighs not over 1,200 pounds, and one man can move it anywhere on the job, or it can be hitched on the back of the tool wagon, doing away with all the cartage that is necessary with big mixers or mixing boards.

"The Standard" Junior mixer is designed so it can often be placed to discharge into the forms, and by placing the material near the mixer, the sand, stone, etc., can be shoveled directly into the mixer, thereby doing away with all the wheeling.

This mixer is similar to "The Standard" regular machines, that are so well known, the only difference is that it is smaller. Any additional information can be had by addressing a card to any of the offices of The Standard Scale & Supply Co.

New Form of Spiral Pipe

The Standard Spiral Pipe Works, 25 North Dearborn street, Chicago, are placing on the market a reinforced galvanized spiral pipe which is made from two strips of steel of different widths and with a continuous interlocking seam. Both strips of steel are rolled to shape on the edges and are interlocked and rolled down under very high pressure in a special machine which this company has patented. The strips of steel are first cut to the required width from long sheets of steel and the ends are welded together. The steel is then placed on large spools. The strips used for the outside or the reinforcing band come from the steel mills in long lengths on reels. Both of these strips are fed into the machine at one end, rolled down and interlocked in the machine, coming out at the other end in the shape of pipe.

This pipe is smooth on the inside and has the reinforcing band running on the outside the entire length of the piece, and can be made endless. This strip is not welded or soldered on the pipe, but is interlocked in the form of a continuous seam. Ample folds are made at both sides so that a large bearing surface or contact is obtained at the seam.

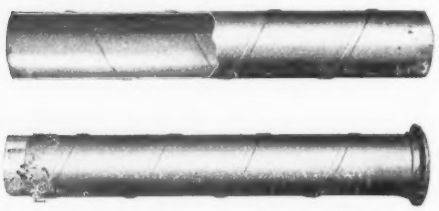
The pipe is smooth on the inside, therefore has the least possible frictional resistance to flow of water or other substances and will not allow particles to adhere to the inner wall of the pipe and thus reduce the diameter and increase the fricton.

Its lightness enables it to be moved easily and also to be instailed in places difficult of access.

At the point where the reinforcing band passes around the pipe there are four thicknesses of metal. A number of bursting tests have been made on this pipe. In one at the Armour Institute, with a piece of 18-inch No. 20 reinforced galvanized spiral pipe, it required 235 pounds of hydraulic pressure to burst the seam. From this it will be noticed that the efficiency of the joint is very great. Another test was made on a piece of 16-inch No. 20 gage where the hydraulic pressure rose to 320 pounds, at which the wide band of steel between the two seams commenced to bulge out and actually expanded ¾ inch in diameter. The pressure was then turned off and it was found that the seam had not been affected in the least. There was no sign of fracture or opening up of the seam either on the inside or on the outside.

This company is furnishing a slip sleeve joint made with a seamless sleeve welded into one end of the pipe. Lugs are also welded on the outside of the pipe. In making connections one end is slipped into the other and the pipes are then drawn together by wires over the lugs and a good joint is obtained for water pressure up to sixty pounds.

The other style connection which this company uses is a forged steel flange which is electrically welded on to the end



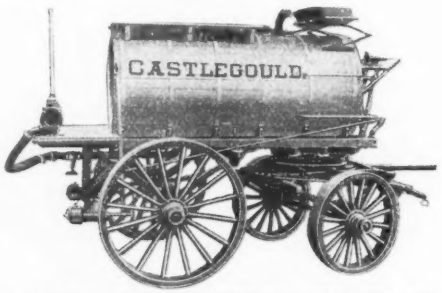
NEW FORM OF SPIRAL PIPE.
Section of Pipe Showing Spiral Joints.

of the pipe and furnished with bolts and gaskets complete. The pipe is furnished in any required length.

This pipe can also be furnished with cast iron or forged steel bolted joints. The company is prepared to furnish fittings and valves necessary for a complete installation of water supply, exhaust steam, blow pipe, and dust collecting systems.

A Park and Cemetery Sprinkler

The accompanying photograph shows the Austin platform gear sprinkler used on the estate of Mr. George Gould, New York. This sprinkler is equipped with platform and pump for watering flower beds and for spraying trees and shrubbery, and can be used to advantage in all parks and cemeteries. The single lever pump mounted on the rear platform can be arranged to either empty or fill the tank. In some cases the sprinkler can be used for country road work.



A PARK AND CEMETERY SPRINKLER.
Note Attachments for Tree Spraying.

Trade Publications.

Hetherington and Berner, Indianapolis, Ind., have prepared a booklet describing asphalt paving plants and machinery. It contains much of general interest in relation to plants for the handling of asphalt, and is well illustrated. The portion of the booklet relating to the construction of their railway car plants contains a number of points of design which are not familiar to the average engineer.

The September issue of the Bulletin published by the Universal Portland Cement Co., 72 West Adams street, Chicago, Ill., contains mention of a type of girder bridge used widely in Illinois, some tests of concrete pipe, concrete roads, a filtration plant in Niles, O., and some notes on concrete bridge and culvert design.

The B. F. Goodrich Co., Akron, O., have a number of publications describing the application of their type of "wireless" tires for motor trucks. Especial mention is made of municipal trucks, and the features recommending the "wireless" to fire motor service.

The Kelly Island Lime & Transport Co., Cleveland, O., have a small but interesting pamphlet describing their product, "Rubber Stone," which is a chloride road compound.

The Jeffrey Manufacturing Co., Columbus, O., has issued Bulletin No. 74, containing 134 various illustrations, showing mechanical equipments that were designed especially for the economical handling of various materials, including an improved type of finger tray elevators for raising and lowering packages, barrels, boxes, sacks, etc., also their swinging tray elevator platform carriers designed for a variety of uses.

The particular features of the Troy dump wagon are described in a recently published folder by the Troy Wagon Works, South Crawford street, Troy, O. Mention is made of the oak used in the beds, the steel doors, and the system of operation of the dump doors.

The Goulds Manufacturing Company, Seneca Falls, N. Y., have just issued a new edition of Bulletin No. 109, dealing with pressure pumps. This publication covers types of pumps for special services requiring special features of construction, such as pumps for water works, oil pipe lines, refineries, chemical and refrigerating purposes, hydraulic pressure, etc. Specifications are given for double-acting triplex plunger pumps, double-acting duplex plunger pumps, portable electric triplex and duplex mine pumps, single-acting triplex pressure pumps and ammonia triplex piston pumps.

IMPROVEMENT AND CONTRACTING NEWS

ROADS AND PAVEMENTS.

BIDS REQUESTED.

Bloomington, Ind.—Oct. 8, 2 p. m. Constructing two stone roads in Perry and one in Richland township. Horace Blakely, auditor.

Crawfordsville, Ind.—Oct. 8, 10 a. m. Constructing eleven gravel roads. Bennett B. Engle, auditor.

Crown Point, Ind.—Oct. 8, 12 m. Constructing three gravel roads. Chas. A. Johnson, auditor.

Lafayette, Ind.—Oct. 9, 10 a. m. Constructing a gravel road. Bond double the amount of bid. Geo. W. Baxter, auditor.

Lawrenceburg, Ind.—Oct. 8, 12 m. Constructing highways in three townships for a distance of about 10 miles. Wm. S. Fagaly, auditor of Dearborn county.

Logansport, Ind.—Oct. 8, 10 a. m. Constructing two roads in Eel township and one in Boone township. J. E. Wallace, auditor.

Madison, Ind.—Oct. 8, 11 a. m. Grading, draining and paving a road in Monroe township. Estimated cost, $3,995. Bond double the amount of bid. A. M. Taff, auditor Jefferson county.

Marion, Ind.—Oct. 8, 2 p. m. Constructing a gravel road in Washington township. E. H. Kimball, auditor.

Rockville, Ind.—Oct. 8, 1:30 p. m. Constructing two gravel roads in Washington and one in Howard township. James E. Elder, auditor.

Vincennes, Ind.—Oct. 8, 2 p. m. Constructing a gravel road in Johnson and Vincennes townships. John T. Scott, auditor.

Washington, Ind.—Oct. 8, 2 p. m. Constructing a gravel road in Washington township. Lew S. Core, auditor.

Winamac, Ind.—Oct. 10, 12 m. Constructing gravel road in county. W. E. Munchenburg, auditor.

Cleveland, O.—Oct. 9, 11 a. m. Improving the Warren road. Certified check, $1,000. Frank R. Lander, county surveyor; John F. Goldenbogen, clerk, Cuyahoga county.

Cleveland, O.—Oct. 9, 11 a. m. Improving the Warren, Munn and Triskitt roads. Certified check, $1,000. John F. Goldenbogen, clerk of Cuyahoga county.

Columbus, O.—Oct. 11, 2 p. m. Grading and paving with bituminous surface treated concrete and brick pavement the Ashland-New London road. State highway "F," Pet. No. 339. Length, 2.51 mi.; width, 14 ft. Estimated cost, $2,373.60. Certified check, $300. James R. Marker, Columbus, O., state highway commissioner.

Columbus, O.—Oct. 11, 2 p. m. Grading and paving the Owl Creek road with waterbound gravel macadam. State highway "D" Pet. No. 611. Length, 2 mi.; width, 10 ft. Estimated cast, $2,373.60. Certified check, $300. James R. Marker, Columbus, O., state highway commissioner.

Columbus, O.—Oct. 11, 2 p. m. Grading and paving the Sinking Springs road with waterbound macadam. State highway "G." Pet. No. 615. Length, 1 mi.; width 12 ft. Estimated cost, $2,778. Certified check, $300. James R. Marker, Columbus, O., state highway commissioner.

Columbus, O.—Oct. 11, 2 p. m. Grading and paving the Waverly-Beavertown road with waterbound macadam and concrete. State highway "F," Pet. No. 613. Length, 1 mi.; width, 12 ft. Estimated cost, $4,123.75. Certified check, $300. James R. Marker, Columbus, O., state highway commissioner.

Columbus, O.—Oct. 11, 2 p. m. Grading and paving the Piketown-Richmond road with waterbound gravel macadam. Length, 1 mi.; width, 10 feet. Estimated cost, $2,829.85. Certified check, $300. James R. Marker, Columbus, O., state highway commissioner.

Columbus, O.—Oct. 11, 2 p. m. Grading and paving the Grassy Fork road with waterbound gravel macadam. State highway "C," Pet. No. 610. Length, 2.09 mi.; width, 10 ft. Estimated cost, $3,558.60. Certified check, $300. James R. Marker, Columbus, O., state highway commissioner.

Columbus, O.—Oct. 11, 2 p. m. Grading and paving the Lake Shore road with bituminous surface treated concrete pavement. State highway "E," Pet. No. 608. Length, 1 mi.; width, 12 ft. Estimated cost, $7,137.30. Certified check, $300. James R. Marker, Columbus, O., state highway commissioner.

Columbus, O.—Oct. 11, 2 p. m. Grading and paving the Delphos and Ft. Jennings road with waterbound macadam. State highway "B," Pet. No. 637. Length, 3.45 mi.; width, 14 ft. Estimated cost, $10,716.99. Certified check, $300. James R. Marker, Columbus, O., state highway commissioner.

Columbus, O.—Oct. 11, 2 p. m. Grading and paving the Akron-Canton road with brick. State highway "F," Pet. No. 495. Length, .93 mi.; width, 13 and 14 ft. Estimated cost, using sandstone curb, $31,163.98; estimated cost, using concrete curb, $29,720.95. Certified check, $300. James R. Marker, Columbus, O., state highway commissioner.

Columbus, O.—Oct. 11, 2 p. m. Grading and paving the Big Basin road with waterbound gravel macadam. State highway "E." Pet. No. 612. Length, .97 mi.; width, 10 ft. Estimated cost, $3,168.06. Certified check, $300. James R. Marker, Columbus, O., state highway commissioner.

Columbus, O.—Oct. 11, 2 p. m. Grading and paving the Wadsworth-Wooster road with brick. State highway "C." Pet. No. 548. Length, .77 mi.; width, 10 ft. Estimated cost, $9,654.42. Certified check, $300. James R. Marker, Columbus, O., state highway commissioner.

Columbus, O.—Oct. 11, 2 p. m. Grading and paving the State road with bituminous surface treated macadam. State highway "D," Pet. No. 607. Length, 1 mi.; width, 10 ft. Estimated cost, $5,835.10. Alternate bids will be received for paving the same with a bituminous surface treated concrete pavement. Estimated cost, $6,967.90. Certified check, $300. James R. Marker, Columbus, O., state highway commissioner.

Columbus, O.—Oct. 11, 2 p. m. Grading and paving the Springfield road with sulphite macadam. State highway "C," Pet. No. 543. Length, 2.55 mi.; width, 16 ft. Estimated cost, $15,399.10. Alternate bids

will be received for grading and paving the same with bituminous bonded macadam. Estimated cost, $16,842.82. Certified check, $300. James R. Marker, Columbus, O., state highway commissioner.

Huntington, W. Va.—Oct. 9, 1 p. m. Grading, curbing and paving Bridge street; also constructing a lateral sewer in an alley. Certified check, $500. L. A. Pollock, commissioner of streets; A. B. Maupin, city engineer.

CONTRACTS AWARDED.

Mobile, Ala.—Constructing six miles of state-aid road, to A. F. Bearden, Birmingham, Ala., $12,000.

Freeport, Ill.—Paving Henderson avenue, to Gund-Graham Co., $29,901.

Monmouth, Ill.—Paving South D street, to the Burlington Construction Co., $15,400.

Peoria, Ill.—Paving Fourth street with brick, to Canterberry Bros., $14,799. Paving Arcadia avenue with brick, to A. D. Thompson Co., $30,351.

Urbana, Ill.—Paving Orchard street, Lincoln avenue and Michigan avenue, to John W. Stipes, Champaign, Ill., $40,000.

Argus, Ind.—Constructing a stone road, to Beal & Belle, Logansport, Ind., $26,789.

Bicknell, Ind.—Constructing 8,000 ft. of curb and gutter, to Harry Marberry, and paving several streets with brick paving, to Ewing Shields, $38,000.

Gary, Ind.—Improving West Fifth avenue, to the Cain Construction Co., $19,931.85.

Marion, Ind.—The following road contracts have been awarded: The Daniel Gunder road, to Dillard Artis, $15,388; the John T. Williams road, to Erie Stone Co., $10,490.

Shreveport, La.—Paving five miles of the Harts Island road, to R. E. Shisler, $22,000.

Baltimore, Md.—Paving Oren avenue, Parkwod avenue and Woodbrooks avenue, to F. E. Schneider Paving Co., $11,843.50.

Owosso, Mich.—Paving West Main street, to Andrew Geeck, $17,000.

Meridian, Miss.—Constructing 22 miles of sand clay road, to the Healy Construction Co., $50,000.

Poplar Bluff, Mo.—Paving several streets, to Roy L. Williams, Cairo, Ill., $86,000.

St. Louis, Mo.—The following paving contracts have been awarded: Alaska street with brick, to Eyermann Construction Co., $21,613; reconstructing Ninth street with brick, to Skrainka Construction Co., $36,451; improving Terry street with asphalt, to the Trinidad Asphalt Mfg. Co., $12,913; improving Minnesota street with wood, to Eyermann Construction Co., $23,808; improving Fair street, to Perkison Bros. Construction Co., $17,330.

Vandalia, Mo.—Paving Main street, to the Illinois Construction Co., Springfield, Ill., $21,000.

Long Island City, N. Y.—Paving Seneca avenue with asphalt blocks, to Cannon Engineering Co., $99,960.

Akron, O.—The following paving contracts have been awarded: Annadale street, to Windsor Bros., $12,525.56; paving Augusta street, to E. McShaffrey, $36,472.21; Princeton street, to Windsor Bros., $14,579.08; Harvard street, to the same, $19,284.80; Yale street, to the same, $13,167.05.

Alliance, O.—Paving Vine street, to J. C. DeVine Co., $20,022.

Cincinnati, O.—Improving the Clough creek pike, to Van Camp Bros., $10,746.

Columbus, O.—Constructing eight miles of macadam road in Union, Madison and Franklin counties, to J. M. Stouffer, $40,000.

East Liverpool, O.—Paving the Lisbon road, to Patterson & Grafton, Wellsville, O., $17,740.39.

Marion, O.—Resurfacing Prospect street and paving Lincoln avenue, to the Asphalt Block Co., Toledo, O., $16,756.

Toledo, O.—Paving Albion street with vitrified brick, to John McMahon, $35,512.

Durant, Okla.—Paving North Third street for a distance of six blocks, to the Cleveland-Trinidad Paving Co., Cleveland, O., $17,397.

Stillwater, Okla.—Paving several streets with asphaltic concrete, to the Radcliffe-Dudley Construction Co., Nowata, Okla., $42,000.

Port Allegheny, Pa.—Paving two streets, to John Sheehan, Bradford, Pa., $18,244.13.

Warren, Pa.—Paving Main street, to L. A. Coates, $22,768.

Wilkes Barre, Pa.—Constructing 10,200 ft. of rock road, to B. G. Coon Construction Co., $22,078.

Memphis, Tenn.—The following paving contracts have been awarded: East Iowa street with brick, to M. E. Larkin, $15,150; Third street with wood block, to the same, $14,474.

Houston, Tex.—Paving Houston avenue with brick, to Horton & Horton, $12,621.

Temple, Tex.—Paving Central avenue with brick, to J. A. Gregory, Dallas, Tex., $26,380.

Stanwood, Wash.—Paving Main and Market streets, to A. R. Gibson, Seattle, Wash., $14,618.

Toppenish, Wash.—Paving several streets with bitulithic, to the Barber Asphalt Paving Co., Spokane, Wash., $70,426.

Huntington, W. Va.—Constructing the McCoy road, to H. L. Wright, $20,000.

CONTEMPLATED WORK.

Larkspur, Cal.—A $35,000 bond issue for street improvement has been voted. E. G. Vocke, town clerk.

Ontario, Cal.—A $72,000 bond issue for street improvement has been voted. R. O. Brackenridge, city clerk.

San Francisco, Cal.—The paving of a street, to cost $90,000, is contemplated. Board of Public Works.

Denver, Col.—Paving of old Sante Fe Trail is contemplated at an estimated cost of $53,966. Board of Public Works.

Plant City, Fla.—A $25,000 bond issue for paving construction has been voted.

Longmeadow, Mass.—Grading and filling of state road is contemplated. Appropriation, $15,000. W. F. Emerson, town clerk.

Winona, Miss.—A $40,000 bond issue for road improvement has been voted. Jos. T. Parke, county clerk.

Springfield, Mo.—An $18,000 bond issue for road construction has been voted.

Mamarneck, N. Y.—A $35,000 bond issue for the improvement of Post road has been voted.

Charlotte, N. C.—Improvement of various streets, to the amount of $400,000, is contemplated. Joseph Firth, city engineer.

Akron, O.—Grading, curbing and paving several streets and constructing sidewalks in same streets is contemplated. W. L. Carlton, president of council.

Alliance, O.—The grading, draining, curbing and paving of several streets with brick is contemplated. Chas. O. Silver, city clerk.

Roseville, O.—The paving of five streets, at an estimated cost of $10,000, is contemplated.

Wilsville, O.—The paving of Commerce street is contemplated. W. H. Moore, mayor.

Bartlesville, Okla.—The paving of several streets is contemplated. City Engineer Kirkpatrick.

Franklin, Tex.—A $100,000 bond issue for road improvement has been voted. State highway commissioners.

Houston, Tex.—A $300,000 bond issue for paving construction has been voted.

Sherman, Tex.—A $100,000 bond issue for paving construction has been voted.

Chatham, Va.—A $100,000 bond issue for road improvement has been voted. S. S. Hunt, clerk Dan River district.

Norfolk, Va.—Paving construction, to cost about $23,000, is contemplated.

SEWERS.

BIDS REQUESTED.

Wilkes Barre, Pa.—Oct. 9, 6 p. m. Constructing a storm sewer on Main street. Certified check, $100. Frank C. Rowe, secretary, 727 Hazel avenue.

Huntington, W. Va.—Oct. 9, 1 p. m. Grading, curbing and paving Bridge street; also constructing a lateral sewer in an alley. eCrtified check, $500. L. A. Pollock, commissioner of streets; A. B. Maupin, city engineer.

CONTRACTS AWARDED.

Rockford, Ill.—Constructing the Auburn street sewer, to E. R. Harding, $38,000.

St. Charles, Ill.—Constructing several sewers, to Dearborn & Jackson, Cedar Rapids, Ia., $100,000.

Detroit, Mich.—Constructing several sewers, to Carpenter & Anderson, Grand Rapids, Mich., $150,000.

Albert Lea, Minn.—Constructing a sewer on several streets, to Illstrup & Olsen, $24,052.

Enderlin, N. D.—Constructing a sewer system, to William Robertson and L. K. Van Alstine, Grand Forks, N. D., $30,000.

Providence, R. I.—Constructing sewers in Washington Park district, to Frederick E. Shaw, $29,034.

Seattle, Wash.—Constructing the Brooklyn avenue sewer, to the International Dredging Co., $43,588.

CONTEMPLATED WORK.

Russellville, Ark.—Plans for a sewer, to cost $28,000, have been completed.

Haywood, Cal.—A $62,000 bond issue for sewer construction has been voted. F. Griffith, city secretary.

Hermet, Cal.—A $44,000 bond issue for a sewer system and disposal plant has been voted. Frank Lathrop, Higgins Bldg., city engineer.

Plant City, Fla.—A $25,000 bond issue for sewer improvement has been voted.

Morris, Ill.—The city will construct a sewer system at an estimated cost of $51,374.

St. Charles, Ill.—The construction of a sanitary sewer system complete is contemplated. G. N. Lamb, city engineer.

Duluth, Minn.—The construction of a sanitary sewer, with four booster pumps, to cost about $21,500, is contemplated. John Wilson, city engineer.

Kermett, Mo.—A $75,000 bond issue for water works and sewers has been voted.

Madison, Neb.—A $16,000 bond issue for sewer construction has been voted. F. J. Dauken, city clerk.

Albuquerque, N. M.—The construction of a storm sewer is contemplated. J. N. Gladding, city engineer.

Beverly, Pa.—The construction of a sewer system, to cost $35,000, is contemplated.

Donora, Pa.—The construction of several public sewers is contemplated. George W. Allen, borough clerk.

Scranton, Pa.—A $15,000 sewage disposal plant is contemplated. Scranton Poor Board.

Sharon, Pa.—A $100,000 sewage disposal plant is contemplated.

Knoxville, Tenn.—A $125,000 bond issue for sewer improvement has been voted.

Cuero, Tex.—A $25,461 bond issue for a sewer system has been voted.

Yoakum, Tex.—A $32,000 bond issue for sewer construction has been voted.

Chase City, Va.—A $20,000 bond issue for sewer improvement has been voted. N. H. Williams, city treasurer.

Petersburg, Va.—A $300,000 bond issue for water works, sewers and other improvements has been voted.

WATER WORKS.

CONTRACTS AWARDED.

South Bend, Ind.—Constructing a 6,000,000-gallon reservoir, to C. H. DeFrees, $51,676.

Medicine Lodge, Kan.—Constructing a water works plant, to the Kansas Construction Co., $40,000.

Dennison, O.—Constructing a 20-mile water system between New Comerstown and Cambridge, including two reservoirs, a pumping station and a 10,000,000-gallon reservoir, to the American Water Supply Co., Pittsburgh, Pa., $500,000.

Dallas, Tex.—Constructing a water purification plant, to the American Water Softener Co., Philadelphia, Pa., $201,674.67. Plans were prepared by James H. Fuertes, New York City.

Grafton, W. Va.—Constructing improvements to the water works system, to the Enterprise Construction Co., Elkins, W. Va., $86,000.

CONTEMPLATED WORK.

El Centro, Cal.—A $40,00 bond issue for water works improvement has been voted.

Sacramento, Cal.—The installation of new pumps at the water works pumping station, at an estimated cost of $25,000, is contemplated.

Kersey, Col.—The construction of a $10,000 water works system is contemplated. Marshall E. De Wolfe, town clerk.

Winter Park, Fla.—A $12,000 bond issue for water works improvement has been voted.

Pooler, Ga.—A $10,000 bond issue for water works improvements has been voted.

Driggs, Idaho—A $10,00 bond issue for water works installation has been voted.

Freport, Ill.—A $25,00 bond issue for water works improvement has been voted.

Olney, Ill.—A $35,000 bond issue for water main extension has been voted.

Churdan, Ia.—A $15,000 bond issue for water works and electric lighting system has been voted.

Honeoye Falls, N. Y.—A $42,000 bond issue for water works improvement has been voted.

Tonkawa, Okla.—A $20,000 bond issue for the construction of a water works system has been voted.

Lima, O.—A $100,000 bond issue for water works construction has been voted.

Henrietta, Tex.—An $18,00 bond issue for water works improvement has been voted.

Sherman, Tex.—A $10,000 bond issue for water main extension has been voted.

Chase City, Va.—A $25,000 bond issue for water works improvement has been voted. N. H. Williams, city treasurer.

Petersburg, Va.—A $300,000 bond issue for water works, sewers and other improvements has been voted.

Farmington, Wash.—The installation of a $10,000 water works system is contemplated.

Tacoma, Wash.—The construction of a water main on several streets is contemplated. Homer H. Edwards, city clerk.

Fond du Lac, Wis.—A $25,000 bond issue for water works improvement has been voted.

Encampment, Wyo.—A $30,000 bond issue for a water works system has been voted.

Rawlins, Wyo.—A $30,000 bond issue for water works improvement has been voted. C. W. Morgan, mayor.

Shoshone, Wyo.—A $12,000 bond issue for water works improvement has been voted. Theo. Becker, mayor.

BRIDGES.

BIDS REQUESTED.

Stockton, Cal.—Oct. 8, 10 a. m. Constructing the Garwood bridge. Eugene D. Graham, clerk.

Bluffton, Ind.—Oct. 8, 10 a. m. Repairing the bridge over the Wabash river. Board of county commissioners.

Sante Fe, N. M.—Oct. 8, 12 m. Constructing a bridge at the Orroyo Atascoso near Galtsteo, N. M. Certified check, 10 per cent. Jose Ortiz Y Pino, chairman; M. O. Ortiz, clerk, Sante Fe county commissioners.

Cleveland, O.—Oct. 23, 11 a. m. Constructing a steel bridge. John F. Goldenbogen, clerk commissioners of Cuyahoga county.

Lorain, O.—Oct. 14, 1 p. m. Constructing new abuttments to the Reis bridge on Marks road. T. L. Gibson, county surveyor.

Huntsville, Tex.—Nov. 11. Constructing two bridges, 50 and 75-ft. spans. A. T. Randolph, county clerk.

CONTRACTS AWARDED.

Birmingham, Ala.—Constructing a bridge over Mulberry creek, to the Virginia Bridge Co., $20,000.

Little Rock, Ark.—Constructing the Little River bridge, to the Vincennes Bridge Co., Vincennes, Ind., $12,185.

Pine Bluff, Ark.—Constructing the Free bridge across the Arkansas river, to the Roemheld Construction Co., Chicago, Ill., $605,000.

Sac City, Ia.—Constructing a bridge over Coon river on Main street, to the Clinton Bridge Iron Co., $11,800.

Pittsburgh, Pa.—The following bridge contracts have been awarded: Repairing the Seventh street bridge ,to Pittsburgh Construction Co., $44,000; repairing the Thirtieth street bridge, to the same, $27,000.

Clintonville, Wis.—Constructing the Main street bridge, to the Worden Allen Co., Milwaukee, $8,000.

CONTEMPLATED WORK.

Washington, D. C.—Plans for a $275,000 bridge across Rock creek at Q street have been completed. T. C. J. Bailey, engineer of bridges of the District.

Macon, Ga.—The construction of a bridge, to cost $20,000, is contemplated. County commissioners.

Dayton, O.—A $15,000 bond issue for bridge construction has been voted.

Pittsburgh, Pa.—Construction of a $500,000 bridge is contemplated. Bureau of construction.

GARBAGE DISPOSAL, STREET CLEANING AND SPRINKLING.

CONTEMPLATED WORK.

Oakland, Cal.—Plans have been completed for a $60,000 incinerator.

Tampa, Fla.—The city will purchase a street sweeper, sprinkler and some garbage carriers. D. B. McKay, mayor.

STREET LIGHTING.

CONTEMPLATED WORK.

Churdan, Ia.—A $15,000 bond issue for water works and an electric lighting system has been voted.

New London, Ia.—A $2,000 bond issue for an electric light plant has been voted.

Mt. Clemens, Mich.—The construction of an ornamental lighting system or "White Way" is contemplated.

Frederickstown, Mo.—A $12,000 bond issue for a municipal electric light plant has been voted.

Ephrata, Pa.—A $10,000 bond issue for electric light improvement has been voted.

FIRE APPARATUS.

CONTEMPLATED WORK.

Tampa, Fla.—The city will purchase a combination hose and chemical car in thirty days. The purchase of another car is contemplated. D. B. McKay, mayor.

Sherman, Tex.—A $12,000 bond issue for the fire department has been voted.

Milwaukee, Wis.—Will ask for about 1,000 ft. of hose for motor fire truck. Director of public service.